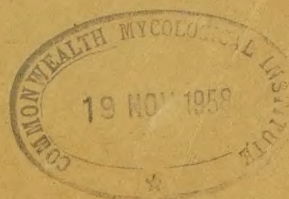
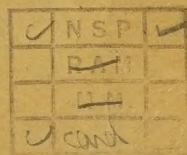


BIOLOGIA

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No. 1

Digestive tract of cercaria of *Fasciola gigantica*

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Thomas (1883) described the digestive tract in the developing cercaria of *Fasciola hepatica*, as follows :

"Immediately following the oral sucker is the rounded pharyngeal bulb. Then comes a narrow oesophagus ascending slightly towards the dorsal surface, and at a short distance in front of the ventral sucker it bifurcates to form the two limbs of the intestine, which reach one on each side of the ventral sucker, to nearly the end of the body. The limbs of the digestive tract are solid, being formed for the most part by single rows of thick disc shaped cells (fig. 13). The cells are finely granular at this stage and show out distinctly against the clear spheroidal cells which surround the limbs and produce concave impressions on the surface."

The digestive tract described by Thomas (1883), belonged to the developing cercaria in which the oval mass of cells (the germ) has constricted off to form the rudiment of the tail and which, as yet, is very stumpy. The cells at this stage of development have separated at the anterior end to form an oral sucker, and, in the centre of the inferior surface to form a ventral sucker.

In spite of the fact that Thomas (1883) found it hard to see the intestinal cæca in the free cercaria and stated that "the other organs of the body are much obscured by the presence of the opaque cystogenous cells..." he did, nevertheless, illustrate the cæca (essentially of the same character as represented by him in the developing form) in his fig. 19 which shows a free cercaria.

The description and diagrams of the cercaria by Thomas (1883) found their way freely into works on the subject published by subsequent authors, and Wright (1927) quite correctly summed up the position,

remarking that "succeeding writers appear to have contented themselves, for the most part, with repeating Thomas's description and reproducing his figures . . .". So much importance appears to have been attached to the character of the digestive tract as figured and described by Thomas (1883), that this criterion has been advanced as a fundamental proposition. For instance, Fantham, Stephens & Theobald (1916) while discussing the identity of young flukes obtained from opaque lens of an old woman and a five months old child in Dresden, stated that "The fact that Ammon found that the intestinal cæca of the worm discovered by him had no lateral branches does not negative the above opinion, as in the liverfluke the intestinal cæca are originally unbranched and according to Lutz they only develop lateral ramifications later between the twelfth and twenty-second day of infection." The same authors in their fig. 144 reproduce a drawing by Leuckart representing a "young *Fasciola hepatica*, soon after entry into the liver". The intestinal cæca in the specimen are shown having ramifications. In another figure (fig. 134) by these authors, drawn after Leuckart, representing a free cercaria, only the œsophagus and a small proximal portion of the intestinal cæca are shown, while the main portions of the cæca are obscured by the cystogenous cells.

The youngest fluke collected by Thomas (1883) from the liver of a naturally infected sheep, measured 1.10 mm. and is represented in his figure 23. This size would be attained by the fluke within about 12 days of infection of the host. The digestive tract, which, according to Thomas (1883), is simply forked in the cercaria, has already acquired a large number of branches, though they are comparatively simple as yet.

Lutz (1893) quite evidently observed the ramifications in the gut of a four days old fluke which is the youngest one he could collect. Lutz stated, "Der Darm ist bedeutend in die Länge gewachsen und verläuft nur bei stark gestrecktem körper geradlinig; im Ruhestande, noch mehr bei Verkürzung der Längsaxe des körpers, legt er sich in Falten, welche einer beginnenden dendritischen Verzweigung täuschend ähnlich sehen können; von der letzteren fehlt indessen noch jegliche Andeutung." The fluke discussed by Lutz, however, belonged to the species *F. gigantica* and not *F. hepatica*, as disclosed by Alicata (1938).

Wright (1927), however, made an attempt to augment the description by Thomas (1883) of the redia and cercaria of *F. hepatica*. In so far as the digestive tract of cercaria is concerned, he added very little to the existing knowledge, except that he found the gut to fork some distance in front of the ventral sucker and not close to it. It is possible that this difference between the observations of Wright (1927) and Thomas (1883), may have arisen as a result of the state of contraction in which the

cercariae had been fixed. Wright shows a long oesophagus in his text figure I (a partly diagrammatic representation of the cercaria) and describes it as "very tenuous, and not easily seen either in fresh or in stained material." The branches of the gut are described by Wright as very much broader than the oesophagus and to run almost to the posterior end of the body.

Bhalerao (1935) showed two simple unbranched intestinal caeca in his figure of the cercaria of *Fasciola gigantica*. The fact that Bhalerao had drawn the caeca so short and that he failed to show or even describe the most conspicuous features of the cercaria, viz. the cystogenous cells, may even suggest that Bhalerao did not draw from a specimen of cercaria of *F. gigantica* but another species of cercaria.

Alicata (1938) and Faust (1949), respectively, reproduced original drawings of cercaria of *F. gigantica* and *F. hepatica* and both the authors figured the intestinal caeca as simple and unbranched and reaching nearly the posterior margin of the body.

Dawes (1946) discussed the morphology of cercaria of *F. hepatica*, stating that "the pharynx, oesophagus and forked intestine are recognizably of trematode pattern though much simpler than in the adult of the species, the last named organ being devoid of lateral branches." His fig. 4 J, drawn after Thomas (1883), is, in many ways, a not very faithful reproduction of Thomas's work.

Skrjabin (1948) described the intestinal caeca of cercaria of *F. hepatica* as simple and unbranched.

Thapar & Tandon (1952) reproduced a highly unsatisfactory drawing of cercaria of *F. gigantica* in their figures 28-30. The intestinal caeca, in their drawings, do not even reach the ventral sucker and they are described as straight and tubular.

The position may be summed up as follows. Thomas (1883) and Wright (1927) figure and describe a comparatively long oesophagus and a forked gut composed of granular disc-shaped cells with the limbs of the gut reaching nearly the posterior margin of the body of the cercaria. On the other hand, Alicata (1938), Faust (1949) and Skrjabin (1948) figured a comparatively short oesophagus and the forked gut as tubular and unbranched. The posterior endings of the limbs of the caeca in drawings of both the authors reach nearly the posterior margin of the body. And yet, Bhalerao (1935) and Thapar & Tandon (1952) figured and described the digestive tract as consisting of an oesophagus and a tubular unbranched forked gut, the limbs of the latter terminating near the ventral sucker.

TECHNIQUE

The rediae and cercariae dissected out of the snail were cleared of all traces of snail tissue and then fixed in 70% alcohol or 10% formalin. A few drops of Acetic Alum Carmine were added to the alcohol fixative the next day and the larval forms appeared to have picked up all the stain after two days, leaving the alcohol clear. The rediae and cercariae after their staining, were cleared and mounted in creosote for examination. It is pointed out that no differentiation was done during the course of the process. The technique employed for the work ensured the possibility of a thorough examination of the specimens by rotating them on all sides and a good deal of shrinkage brought about through the processes leading to permanent mounts, could be avoided.

OBSERVATIONS

An examination of the material thus treated revealed the presence of two chains of amoeba-shaped granular masses stretching from the oral sucker backwards to the hind end of the body of the cercaria. The granular masses were found to number six in each chain and they were found located near the dorsal surface of the body. The granules picked up a deep red stain and they did not lose it during a number of days the cercariae remained under examination. The mature cercariae still inside the rediae also showed the granular masses distinctly. Some of the cercariae in which the mucous discharge was sticking, did not show the digestive tract and the cystogenous masses of cells, although the genital structures and the excretory bladder were quite easily discernible in such cercariae. It is, however, quite possible that specimens studied by Faust (1949), Skrjabin (1948) and Alicata (1938) belonged to this category of cercaria.

DISCUSSION

Though the digestive tract studied by the author belongs to the species *F. gigantica*, it should be incontestable that the dendritic nature of the gut would also hold for *F. hepatica*. That such authorities as Thomas, Faust, Leuckart and Skrjabin could not trace the digestive tract as described by the present author, must naturally require an explanation, and the author would base his explanation on a consideration of the following two factors :

(a) The peculiar situation of the digestive tract which was found to lie near the dorsal surface. The tract is not traceable from the pharynx

backwards in this situation as it is in a plane different from the oral sucker and the pharynx.

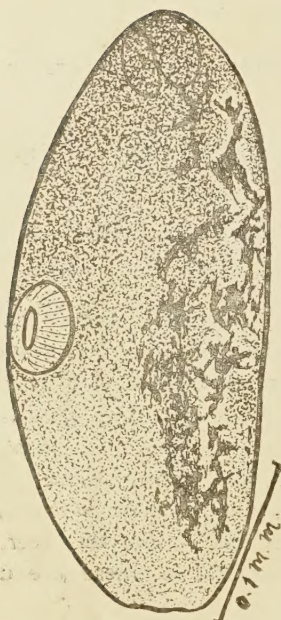
(b) The tract is not recognizable in specimens with mucous discharge sticking around them.

It is quite evident from Thomas's description of 'free cercaria' that he could not trace the gut.

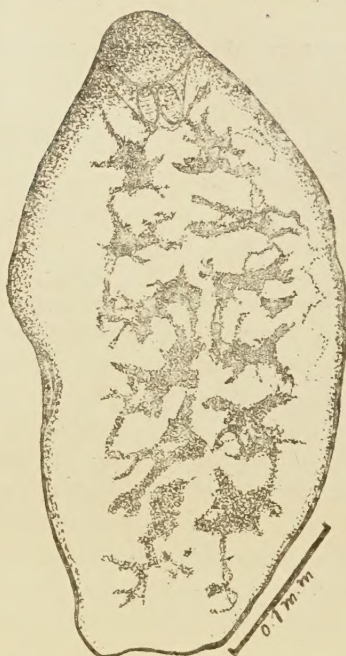
The author after examining more than 50 cercariae, found that the granular masses had a constant number in the cercaria of *F. gigantica*. It is suggested that this character may offer the possibility of clearing up the confusion which exists in the taxonomy of the genus *Fasciola*. As would appear from the description and figures of young *Fasciola* by Leuckart, Thomas and Lutz, the character of the digestive tract is consistently dendritic in the fluke in all its stages, viz., cercaria to the adult form. In a twenty-three days old fluke extracted from the liver, the digestive tract was found in an optical view, to lie near the dorsal surface.

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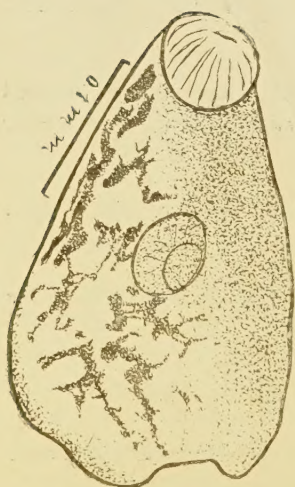
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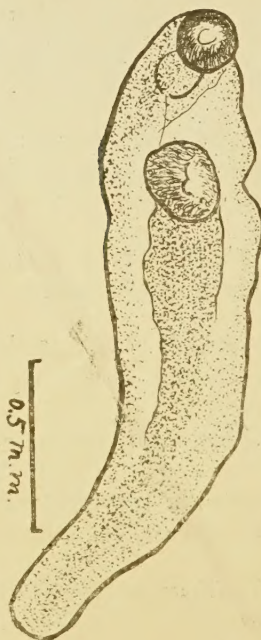
(Fig. 1)



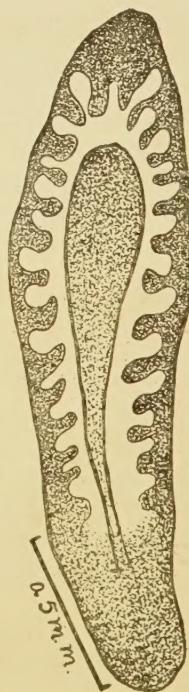
(Fig. 2)



(Fig. 3)



(Fig. 4)



(Fig. 5)

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- Wright, W. Rees (1927). Studies on larval trematodes from North Wales. Part I. Observations on the redia, cercaria, and cyst of *Fasciola hepatica*. *Ann. Trop. Med. & Parasit.* Vol. XXI, No. 1, pp. 47-56.

FASCIOLA GIGANTICA

(Fig. I) : Semi-lateral view of the body of cercaria ; (Fig. II) Dorsal view of the body of cercaria ; (Fig. III) Ventro-laterally distorted body of cercaria ; (Fig. IV) : Ventral view of 23-day old fluke ; (Fig. V) : Dorsal view of a 23-day old fluke.

A note on the nomenclature of *Ipomoea tropica* Sant. & Patel

ZAIN-UL-ABIDIN

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Santpau & Patel have recently published a new name, *Ipomoea tropica*, for *Ipomoea calycina* Benth. ex Clarke (1885), for the reason that it became a later homonym of *Ipomoea calycina* Meissn. (1871). But according to Art. 72 of the Nomenclature Code 1956, the name or epithet to be rejected is replaced by the oldest available legitimate name or (in a combination) the oldest available legitimate epithet. If none exists, a new name or epithet must be chosen. On investigation it has been found that *Ipomoea Hardwickii* (Spreng.) Hemsel., rather than *I. tropica* Sant. & Patel, is the most suitable epithet to replace *I. calycina* Benth. ex Clarke.

It may further be explained that the specific names of *Ipomoea calycina* Benth. ex Clarke and *Aniseia calycina* Choisy (1845) were together based upon *Convolvulus calycinus* Roxb. (1824) as the latter was transferred to the successive genera. But Sprengel in 1827 gave the name *Convolvulus Hardwickii* to *Convolvulus calycinus* Roxb. because the latter became a later homonym of *Convolvulus calycinus* Hum. Bon. & Kunth (1818). Thus it is reasonable to assume that *C. Hardwickii* is another legitimate name for *C. calycinus* Roxb. Although on transference to the genus *Ipomoea* the specific name "*calycinus*" needs have preference, yet because *I. calycinus* becomes a later homonym, one has to look back to "*Hardwickii*". Thus where *I. calycina* Benth. ex Clarke has to be rejected, the name *I. Hardwickii* must take its place and not any other name such as *I. tropica* Sant. & Patel.

It may be mentioned that the plant concerned grows also in China in addition to Africa and India.

Following is the synonymy of *I. Hardwickii*.

Ipomoea Hardwickii (Sprengel) Hemsel., Jour. Linn. Soc., vol. XXVI, p. 160,

1889—1902; Makino, Fl. Jap., p. 976, 1931.

Ipomoea tropica Santpau & Patel, Jour. Bombay Nat. Hist. Soc., vol. 54, p. 798, 1957.

Ipomoea calycina Benth. ex Clarke in Hook. Fl. Brit. Ind., vol. iv. p. 201. 1885, non Meiss., Fl. Bras., vol. vii, p. 260, 1856-1871.

Ipomoea cardiosepala Hochst ex Choisy in D.C. Prodr., vol. ix, p. 429, 1845.

Ipomoea blepharosepala Hochst ex A. Rich. Tent. Fl. Abyss., vol. ii, p. 72.

Aniseia calycina Choisy ex DC., Prodr., vol. ix, p. 429, 1845.

Convolvulus calycinus Roxb., Fl. Ind., vol. ii, p. 51, 1824, non H.B. & K., Nov.

Gen. et Sp. iii, p. 109, 1818.

Convolvulus Hardwickii Sprengel, Syst. Veg., vol. iv, p. 60, 1827.

Additions and corrections to the Flora of Karachi

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W. Pakistan.*

Karachi, the Federal Capital of Pakistan, occupies a vast area of some 550 sq. miles, but still needs a booklet dealing with its natural vegetation. The present paper, it is hoped, will serve as the first step in that direction. It is based on plant collections made in this area during the last 10 years or so. Plants collected from 1948 to 1955 are kept mostly at the D.J. Government Science College, Karachi. Collections made after that period are with the author. From all these collections more than one hundred new records for the area are reported. The paper also includes taxa which required necessary correction in the previous works (Cooke, 1908 ; Sabnis, 1924).

Cooke (1908) quotes some plants from Karachi collected by Woodrow and Stocks. The number recorded for Karachi was increased to some 200 spp. by Sabnis (1924), who quoted specimens from his collections as well as the collections of others. Recently Hasnain and Obaidur Rahman (1957) have published a list of Sind and Karachi plants compiled from the various sources. They give the localities but fail to quote the specimens. Moreover, their list needs many corrections some of which will be noticed in the present paper. There are several plants reported from Karachi in their list but their occurrence here is very doubtful. Some of these are *Cleome quinquernervia* DC., *Moricandia tortuosa* Hook. f., *Reseda Aucheri* Boiss., *Reseda pruinosa* Del., and many more. On the other hand *Farsetia jacquemonti* Hook. f. and Thoms., *Gymnosporia montana* Benth., *Argyrolobium roseum* J. & S., *A. trigonelloides* J. & S., *Astragalus prolixus* Sieb., *Rhynchosia minima* DC., *Pluchea lanceolata* Oliv. and many others which so commonly occur at Karachi have not been reported. One, familiar with the plants of Karachi, fails to understand this anomaly. Consequently, the present paper takes into consideration Sabnis's (1924) work only. If the list given here is combined with that given by Sabnis, it will give, to a great extent, the true picture of the flora of Karachi. However, more records are bound to crop up when the area is surveyed more extensively. At present, there are some 350 spp. recorded from the Karachi area.

Quite a number of duplicates have been sent to the British Museum, London, and the Herbarium at the Royal Botanic Garden, Edinburgh.

Dr. R.R. Stewart has checked most of the grasses and sedges for which the author is deeply indebted to him. I have also been assisted in botanizing by several of my colleagues and friends. I am thankful to all of them and particularly to Mr. I. Ali, Mr. K. Akbar and Mr. S. Ahmed.

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1. *Cocculus pendulus* (Forst.) Diels. in Engler's Pflanzenr. IV(94) 237 (1910).
Syn : *Epibaterium pendulum* Forst., Gen. 108, t. 54 (1776).
C. Loeba DC., Syst. 1,529 (1818).
 2. *Argemone mexicana* L., Sp. Pl. 508 (1753).
Karachi : Malir, near cult. fields, 31.3.55 (No. 833).
 3. *Fumaria indica* Pugsley in Journ. Linn. Soc. Bot. 313 (1919).
Syn : *F. parviflora* Auctt. not of Lam.
Karachi : Cult. fields during winter (Malir, Memongote).
 4. *Farsetia jacquemonti* Hook. f. in Journ. Linn. Soc. Bot. V, 174 (1861).
Subsp. *Jacquemonti*.
Karachi : Drig Road, stony hillock, 25.4.55 (No. 920).
 5. *Coronopus didymus* (L.) Smith, Fl. Brit. ii, 691 (1804).
Syn : *Lepidium didymum* L., Mant., 92(1767) ; *Senebiera pinnatifida* DC. in Mem. Soc. Hist. Par., 144 (1799) ; *S. didyma* (L.) Pers., Syn. ii, 185 (1805).
Karachi : Near cultivated fields during winter (Malir ; Memongote.)
 6. *Physorhynchus brahuicus* Hook. f., Icon. Pl. ii, 821 and 822 (1852).
Karachi, North Nazimabad, stony hillock, Dec. 1956 (*Alvi*.)
 7. *Cleome scaposa* DC., Prodr. I, 239 (1824).
Syn : *C. papillosa* Stend., Nom., ed. 2, i, 382 (1840).
Karachi : Mangopir, stony hillock, common. 18.7.56 (No. 1512) ;
Drig Road, stony hillock.

8. *Cleome viscosa* L., Sp. Pl. 672 (1753).
Karachi : Drig Road, sandy ground, Oct. '51.
9. *Gynandropsis gynandra* (L.) Briq. in Ann. Cons. Jard. Bot. Gen. xvii, 382 (1914).
Syn : *Cleome gynandra* L., Sp. Pl. 671 (1753) ; *G. pentaphylla* DC., Prodr. i, 238. (1824).
Karachi : Clifton, sandy ground, 18.4.56 (No. 1537) ; Malir sandy ground, common, Aug.-Sept. '51 !
10. *Maerua arenaria* (DC.) Hook. f. and Thoms. in Fl. Brit. India i, 171 (1874).
Syn : *Nieuhria arenaria* DC., Prodr. i, 244 (1824).
Karachi : Near Stadium, straggling among bushes of *Euphorbia caducifolia*, stony ground, 6.5.56 (Nos. 1413 and 1428).
11. *Cadaba fruticosa* (L.) Druce in Rep. Bot. Exch. Club, iii, 415 (1914).
Syn : *Cleome fruticosa* L., Sp. Pl., 671 (1753) ; *Cadaba indica* Lam., Encyc. i, 544 (1783) ; '*Cadaba farinosa*' Hook. f. and Thoms. in Fl. Brit. India, i, 173 (1874)-not of Forsk.
Karachi Near Stadium, Stony and sandy hillock, 6.5.56 (No. 1427) ; Dur Mohd. Gote, off Malir Cantt., sandy ground, 4.4.56 (No. 1300) ; Drig Road, stony ground.
12. *Capparis decidua* (Forsk.) Edgeworth in Journ. Linn. Soc. Bot. VI, 184 (1862).
Syn : *Sodada decidua* Forsk., Fl. Aegypt-Arab. 81 (1775) ; *C. aphylla* Roth., Nov. Pl. Sp. 238 (1835).
13. *Capparis cartilaginea* Decne. in Ann. Soc. Nat. II (iii), 273 (1835).
Syn : *C. gareata* Fres., Beitr. Fl. Abyss. in Mus. Senkenb. ii, III (1837-45).
Karachi : Mangopir, stony hillock, 27.12.56 (No. 1553).
14. *Ochradenus baccatus* Delile, Fl. Egypt, 236, t. 31 (1812)
Karachi : Drig Road, among bushes, 25.4.55 (No. 922) ; Near the Stadium, among the bushes of *Euphorbia caducifolia*, stony ground 6.5.56 (No. 1418).
15. *Viola Stocksii* Boiss., Fl. Or. i, 454 (1867).
The status of this species is not definitely known.
Karachi Drig Road, sandy and dry beds of riverlets, common, 25.4.55 (No.900).
16. *Spergula pentandra* L., Sp. Pl. 440 (1753).

- Karachi : chuhar off Malir Cantt., along water channels near the cult. field, common, 4.4.56 (No. 1311).
17. *Portulaca oleracea* L., Sp. Pl. 445 (1753).
Karachi: Along Lyari, sandy and saline wet ground, 15.3.55 (No. 820); Clifton, sandy ground, 20.4.57 (No. 1377).
 18. *Tamarix Troupii* Hale in Indian Forester, XLV, 247 (1919).
Syn : "*T. gallica*" Dyer in Fl. Brit. India, I, 248 (187)—not of Linnaeus.
Karachi : Clifton, sandy ground, 25.4.56 (Nos. 1387 and 1411).
 19. *Tamarix aphylla* (L.) Lanza in Boll. Orto Bot. Palermo, viii, 82 (1909)
syn : *Thuja aphylla* L., Cent. Pl. i, 32 (1755); *T. orientalis* Forsk., Fl. Aegypt., 206 (1775); *T. articulata* Vahl, Symb. ii, 48, t. 32 (1791).
Karachi : Bund Murad near Hub river, 9.4.56 (No. 1362).
 20. *Hibiscus trionum* L., Sp. Pl. 687 (1753).
Karachi : Mangopir, stony hillock, Sept. '56.
 21. *Hibiscus intermedius* A. Rich. Tent. Fl. Abyss. i, 58 (1847).
Karachi : Malir, stony bund of the Malir river, common, 15.7.56 (No. 1501)
 22. *Gossypium Stocksii* Mast. in Fl. Brit. India i, 346 (1874).
Karachi : near Darshana chana, off Malir Cantt., stony and sandy ground, common with *Rhazya stricta*, 4.4.56 (No. 1312); Drig Road rocky and sandy ground, Oct. '51'
 23. *Grewia tenax* (Forsk.) Ascherson and Schweinfurth ex C. Christensen in Dansk. Bot Akiv, iv (3) 21 (1922).
syn : *Chadara tenax* Forsk., Fl. Aegypt-Arab. 105 (1775); *G. populi-folia* Vahl, Symb. i, 33 (1790).
 24. *Corchorus trilocularis* L., Mant. 529 (1767).
Karachi : Nazimabad, along Lyari, sandy ground, 15.3.55 (No. 818).
 25. *Corchorus depressus* (L.) Stocks in Proc. Linn. Soc. Bot. i, 367 (1848); C. Christensen, 1.c.
Syn : *Antichorus depressus* L., Mant., 64 (1767); *C. antichorus* Raensch Nom., 3 ed., 158 (1797).
Karachi : Along Lyari, behind Bihar colony, sandy ground, 13.4.55 (No. 892); Nazimabad.
 26. *Corchorus aestuans* L., Syst., 10th. ed., 1079 (1758).
Syn : *C. acutangulus* Lam., Encyc. ii, 104 (1786).

27. *Tribulus alatus* Delile, Fl. Egypt. iii, 62 (1812).
Karachi : Bukhari Ghaus, Mangopir Rd., sandy ground, 9.4.56
(No. 1323) ; Nazimabad.
28. *Ieg anum harmala* L., Sp. Pl. 444 (1753).
Karachi : Nazimabad, sandy wet ground, casual, 15.3.55 (No. 821) ;
Near Bund Murad, sandy ground, April '51 !
29. *Oxalis corniculata* L., Sp. Pl. 435 (1753).
Karachi : Weed in gardens, especially of flower pots !
30. *Moringa olifera* Lam., Encyc. i, 398 (1779).
Syn : *M. pterygosperma* Gaertn., Fruct. ii, 314 (1791).
Karachi : Cultivated and self sown in many localities !
31. *Argyrolobium roseum* Jaub. and Spach., Illustr., i, 116 (1842).
Karachi : Drig Road, sandy ground, March '50 !
32. *Argyrolobium trigonelloides* Jaub. and Spach., 1.c .
Karachi : Clifton, stony mound, common, 9.4.56 (No. 1344) ; Korangi
sandy roadside: 11.4.56 (No. 1457); Clifton, near the sandy beach,
18.11.56 (No. 1538).
33. *Melilotus indica* (L.) All., Fl. Pedem. i, 308 (1785).
syn : *M. parviflora* Desf., Fl. Atlant. ii, 192 (1800).
Karachi : Along Lyari, sandy wet ground, 13.4.55 (No. 883).
Weed in cult. fields at Malir and Memongote !
34. *Melilotus alba* Desr. in Lam., Encyc. iv, 63 (1890).
Karachi : Malir, near cultivation, Feb. '51 ! ; Weed in cult. field at
Memongote !
35. *Medicago sativa* L., Sp. Pl. 778 (1753).
Karachi : Cultivated for fodder at Malir, Bund murad ! and Memon-
gote. Memongote, 4.4.56 (No. 1287). Often astray and self sown
plants met are in gardens.
36. *Cyamopsis psoraloides* DC., Prodr. ii, 216 (1825).
Karachi : Cultivated at Malir ! and Bund murad ! Often astray plants
are seen near cult. field and gardens. Bund Murad, cultivated field,
9.4.56 (No. 1359).
37. *Indigofera linifolia* Retz., Obs. Bot. fasc. IV, 29 (1786).
Karachi : Near stadium, sandy roadside, common, 6.5.56 (No. 1438) :
Karangi, sandy and rocky beds of dried nala, 11.5.56
(No. 1459).
38. *Sesbania aegyptiaca* Poir., Encyc., vii, 128 (1806).

Karachi : Often met as self sown plant in many localities ! A very quick growing shrub, often grown as hedges.

39. *Astragalus prolixus* Sieb., Pl. Aegypt., in Bunge, Monogr. Astr. i, 9 (1868).

Karachi : Mauripur side, sandy roadside. 10.4.55 (No. 882) ; Clifton, sandy ground near the beach, common 25.4.56 (No. 1390) and 18.11.56 (No. 1536).

40. *Caesalpinia crista* L., Sp. Pl. 380 (1753).
syn : *Guilandina Bonducella* L., Sp. Pl., 2 ed. 545 (1763) ;
C. Bonducella (L.) Fleming in Asiat. Res. xi, 159 (1810).
Karachi : Bund Murad, hedges round the cult. fields, 9.4.56 (No. 1370).
Found only as cultivated plant.

41. *Parkinsonia aculeata* L., Sp. Pl. 375 (1753).
Karachi : Self sown plants are commonly seen in many localities.
Common towards Jinnah hospital and Abyssinia lines.

42. *Cassia occidentalis* L., Sp. Pl. 377 (1753).
Karachi : Sewage farm 20.5.54!

43. *Cassia holosericea* Fresen in Flora i, 54 (1839).
Karachi : Korangi, sandy roadside, common, 11.5.56 (No. 1454).

44. *Cassia angustifolia* Vahl, Symb. Bot., i, 29 (1790).
Karachi : North Nazimabad, sandy grounds along Lyari, common,
9.4.55 (No. 866).

45. *Prosopis juliflora* DC., Prodr. ii, 447 (1825).
Karachi : Along Lyari, behind Bihar colony, 13.4.55 (No. 886).
Clifton, sandy ground, 20.4.56 (No. 1376)

46. *Mimosa hamata* Willd., Sp. Pl. iv, 1033 (1805).
Karachi : Lalukhet, sandy ground Oct. '51 ! ; Between Mangopir and
Bund murad, common in sandy ground, 9.4.56 (No. 1343).

47. *Trianthema crystallina* Vahl, Symb. Bot. i. 32 (1790).
syn : *T. triquetra* Rottl. & Willd. in Ges. Naturf. Fr. Neue Schr.
iv, 181 (1803).
Karachi : Clifton, sandy ground, 18.11.56 (No. 1542) ; Manora !,
Dilawar ; Intelligence school.

48. *Erigeron canadensis* L., Sp. Pl. 863 (1753).
Karachi : Malir, waste field, Oct. '51.
Dilawar ! ; Intelligence school !

49. *Blumca amplexans* DC. in Wight, Contrib. 13 (1834).
Karachi : Lalukhet, sandy ground under shade, 13.10.51 (No. C 14).

50. *Pluchea lanceolata* (DC.) Oliver and Hiern; Fl. Trop. Afr. iii, 329 (1877).
Syn : *Berthelotia lanceolata* DC., Prodr. v, 376 (1836).
Karachi : Mauripur side, sandy and saline ground, 13.4.55 (No. 893) ;
Clifton, sandy ground near the parade, 20.4.56 (No. 1373).
51. *Eclipta alba* (L.) Haussk., Pl. Jav. Rar. 528 (1848).
Karachi : Garden weed ! ; Malir, common along water channels,
Oct. '51.
52. *Echinops echinatus* DC., in Wight, Contr. 24 (1834).
Karachi : Mangopir, hillock, Oct. '51 !
53. *Dicoma tomentosa* Cass. in Bull. Soc. Philon. 47 (1818).
Karachi : Mangopir, stony hillock, common 27.12.56 (No. 1566)
54. *Hochstetteria Schimperii* DC., Prodr. vii, 287 (1838).
Karachi : Drig Road, stony mound, 19.2.51.
55. *Enhydra fluctuans* Lour., Fl. Cochinch. 511 (1790).
Karachi : Malir, Guava gardens under shade, 31.3.55 (No. 831) ;
Memongote, off Malir Cantt. Common near water, 4.4.56
(No. 1291).
56. *Limonium Stocksii* (Boiss.) O. Kuntze, Rev. Gen. 396 (1891).
Syn : *Statice Stocksii* Boiss., in DC., Prodr. xii, 664 (1848).
57. *Anagallis arvensis* L., Sp. Pl. 148 (1753).
Karachi : Malir, near cultivation, Feb. '50 ! ; Memongote !
58. *Salvadora persica* L., Sp. Pl. 122 (1753).
Karachi : Mauripur side, sandy and saline ground, 13.4.55 (No. 879) ;
Mangopir road, grave yard ; Clifton side !
59. *Rhazya stricta* Dene. in Ann. Sc. II, iv, 81 (1835).
Karachi : Near Darshana chana, off Malir cantt., in open rocky and
sandy field, common in association with *Gossypium Stocksii*, 4.4.56
(No. 1313).
60. *Oxystelma esculentum* (Linn. f.) R. Br. in Mem. Wern. Soc. I,
40 (1811).
syn : *Periploca esculenta* Linn. f., Suppl. 168 (1781).
Karachi : Chuhar, off Malir Cantt., climbing on bushes !
61. *Sarcostemma Stocksii* Hook. f. in Fl. Brit. Ind. iv, 27 (1883).
Karachi : Drig Road, stony hillock !
62. *Leptadenia pyrotechnica* (Forsk.) Dene. in Ann. Sc. Nat. II, ix, 269
(1838).

- Syn: *Cynodon dactylon* Forsk., Fl. Aegypt-Arab. 53 (1775).
L. spartium Wight, Contrib. 48 (1834).
 Karachi: Between Mangopir and Bund Murad, sandy ground, common, 9.4.56, (No. 1336); Clifton, stony mound, 20.4.56 (No. 1410).
63. *Caralluma edulis* (Edgew.) Benth. in Gen. Pl., ii, 782 (1876).
 Syn: *Bouccerosia edulis* Edgew. in Journ. Linn. Soc. vi, 205, t. 1. 1862).
64. *Enicostemma litorale* Blume, Bijdr., 848 (1826).
 Karachi: Mangopir side along Lyari, 15.4.55 (No. 897); Drig Road, sandy grounds, common, 25.4.55 (No. 909 and 912); Paradise point, stony ground near the sea, common, 25.6.56 (No. 1481); Malir; Stony river bund, 15.7.56 (No. 1498).
65. *Heliotropium curassavicum* L., Sp. Pl. 130 (1753).
 Karachi: Between Mangopir and Bund Murad, sandy, saline and wet ground, common, 9.4.56 (No. 1338); Korangi, sandy ground near the sea, 11.5.56 (No. 1452); intelligence school.
66. *Heliotropium punctatum* (Hochst.) Vacke, in Oestr. Bot. Zeitschr. 166 (1875).
 syn: *Tournefortia subulna* Hochst. in DC., Prodr. ix, 528 (1845).
 "H. zeylanicum" Auctt.—not of Lamk.
 Karachi: Nazimabad, along Lyari, sandy borders, common, 15.3.55 (No. 817); Memonigate, off Malir Cantt., 4.4.56 (No. 1293).
67. *H. europaeum* L., Sp. Pl. 130 (1753).
 syn: *H. Eichwaldi* Steud. in DC., Prodr. ix, 535 (1845).
68. *H. ramosissimum* (Lehm.) Sieber in DC., Prodr. ix, 536 (1845).
 Syn: *H. undulatum* Auctt.—not of Vahl, Symb. i, 13 (1760).
69. *H. lignosum* Vatte in Oestr. Bot. Zeitschr. 167 (1875).
 Karachi: Bukhari Ghaus, Mangopir Road, rocky and sandy ground, common, 9.4.56 (No. 1318); Between Mangopir and Bund Murad, sandy ground, common, 9.4.56 (No. 1353).
70. *H. strigosum* Willd., Sp. Pl. i, 743 (1812).
 Karachi: Behind Behar colony, along Lyari, sandy ground, common, 15.4.55 (No. 860); Drig road, sandy ground, 25.4.55 (No. 918); Near stadium, sandy roadside, common, 4.5.56 (No. 1433 & 1434).
71. *Trichodesma* cf. *africanum* R. Br., Prodr. 496 (1810).
 Karachi: Malir, dry ditches along railway line, Sept. '51.
72. *Cuscuta reflexa* Roxb., Cor. Pl. ii, 3, t. 104 (1798).
 Karachi: On many hosts, collected by S.I. Ali.

73. *Convolvulus pluricaulis* Choisy, Convol. Orient in Mem. Soc. Phys. Genev. vi, 477 (1834).
Karachi : Malir, sandy ground, 31.3.55 (No. 855) ; Clifton, sandy ground, common near the mound, 20.4.56 (No. 1406) ; Near the Stadium, sandy roadside, 6.5.56 (No. 1450).
74. *Ipomoea pes-caprae* (L.) Sweet, Hort Suburb. 35 (1818).
Syn : *Convolvulus pes-caprae* L., Pl. Sp. 159 (1753) ; *I. biloba* Forsk., Fl. Aegypt-Arab. 44 (1775).
75. *Solanum nigrum* L., Sp. Pl. 106 (1753).
Karachi : Malir, in gardens and near cultivation !
76. *S. albicaule* Kotschy in DC., Prodr. xiii, 204 (1852).
Karachi : Drig Road, sandy and stony mound !
77. *Physalis minima* L., Sp. Pl. 183 (1753).
Karachi : Sewage farm, common, 29-5-56 (No. 1467).
78. *Lycium europeum* L., Sp. Pl. 192 (1753).
syn : *L. barbarum* L., l. c.
79. *Datura alba* Nees in Trans. Linn. Soc. xvii, 73 (1834).
syn : *D. fastuosa* L. var. *alba* (Nees) C.B. Clarke in Fl. Brit. India, iv, 243 (1883).
80. *Kickxia ramosissima* (Wall.) Janchen in Oesterr. Bot Zeitscher. lxxxii, 152 (1933).
Syn : *Linaria ramosissima* Wall., Pl. As. Rar. ii, 43, t. 153 (1831).
Karachi : Mangopir, Stony hillock, in crevices. 27-12-26 (No. 1565).
81. *Schweinfurthia pedicellata* (T. And.) Benth. & Hooker f., Gen. Pl. ii 934 (1876).
syn ; *Anarrhinum pedicellatum* T. Anderson, Fl. Aden in Journ. Linn. Soc. v, suppl. I, p. 26 (1860).
Karachi : Between Mangopir and Bund Murad, sandy soil, common, 9.4.56 (No. 1339).
82. *Bramia Monnieri* (L) Pennell in Proc. Acad. Sc. Philad. lxx, 243 (1952).
Syn : *Lysimachia Monnieri* L., Cent. Pl. ii, 9 (1787) ; *Gratiola Monniera* L., l. c. 120 ; *Monniera cuneifolia* ; Michaux, Fl. Bor. Amer. ii, 22 (1803) ; *Herpestris Moniera* (L.) Benth., Scroph., Ind. 30 (1835) ; *Bacopa Moniera* (L.) Wettstein in New Man. Bot. 724 (1908).
83. *Lindenbergia urticaefolia* Link & Otto, Icon. Pl. Rar. Hort. Berol. t. 48 (1828).
Syn : *L. abyssinica* Hochst. in DC., Prodr. x, 377 (1846).

- Karachi : Bukhari Ghaus, Mangopir Rd., among rocks, common, 9.4.56 (No. 1319) ; Mangopir, stony hillocks, common. 27.12.56 (No. 1558) Drig Road, stony mounds.
84. *L. polyantha* Royle in Benth., Scroph. Ind. 22 (1835).
Karachi : Bund Murad, stony wall near the Hub river, not common 9.4.56 (No. 1364).
85. *Tecomella undulata* (G. Don) Seem, in Ann. and Mag. Nat. Hist. iii (10), 30 (1862).
syn : *Tecoma undulata* G. Don. Gen. Syst. iv, 223 (1837).
Karachi : Near Dur Mohd. Gote, off Malir Cantt., sandy ground, common. 4.4.56 (No. 1302).
86. *Ruellia graecizans* Baker in Brittonia iii, 85 (1938).
syn : *Dipteracanthus longifolius* Stocks in Kew Journ. Bot. iv, 177 (1852) ; *Ruellia longifolia* (Stocks) T. Anders. in Journ. Linn. Soc. ix, 460 (1867)-this name is invalidated by the name given to an African plant earlier by the same author.
Karachi : Drig Road, sandy and rocky mound, April '51 !
87. *Peristrophe bicalyculata* (Vahl), Nees in Wall., Pl. Rar. As. iii, 113 (1832). syn : *Justicia bicalyculata* Vahl, Symb. ii, 13 (1790).
88. *Lantana camara* L., Sp. Pl. 627 (1753).
Karachi : Malir, fairly naturalized at many places !
89. *Lippia nodiflora* (Lam.) Michaux, Fl. Bor. Amer. ii, 15 (1803).
syn : *Zapania nodiflora* Lam., Tab. Encyc. i, 59 (1791).
Karachi : Malir; near water, 31.3.55 (No. 840) ; Memongote, along water channel, common, 4.4.56 (No. 1280).
90. *Avicennia alba* Blume, Bijdr. 821 (1826)
Syn : *A. officinalis* L. var. *alba* Hooker, Fl. Brit. Ind. v, 604 (1887).
Karachi : China creek, tidal swamps, 20.11.51 ; Manora.
91. *Boerhaavia diffusa* L., Sp. Pl. 3 (1753).
Karachi : Nazimabad, sandy beds of the Lyari, 9.4.55 (No. 852) ; Memongote, straggling among bushes, under shade, 4.4.56 (No. 1284) ; Mangopir, sandy grounds, common, 9.4.56 (No. 1352) ; Clifton, sandy ground near the stony mound, 20.4.56 (No. 1405).
92. *Celosia argentea* L., Sp. Pl. 205 (1753).
Karachi : Malir, cult. fields during winter !
93. *Digera arvensis* Forsk., Fl. Aegypt-Arab. 65 (1775).
Karachi : Nazimabad, along Lyari, sandy ground, 9.4.56 (No. 856).
94. *Amarantus viridis* L., Sp. Pl., 2 ed., 1405 (1763).

- Karachi : Mauripur side, sandy roadside, 13.4.55 (No. 859 ; Clifton sandy ground, 20.4.56 (No. 1380).
95. *A. polygamus* L., Amoen. Acad. iv, 294 (1759).
Karachi : Mauripur side, sandy roadside, 13.4.55 (No. 877).
96. *Pupalia orbiculata* Wt., Icon. t. 1783 (1852).
Karachi : Mangopir, stony hillock, 27.12.56 (No. 1653).
97. *Alternanthera triandra* Lam., Encyc. Method. i, 95 (1783).
Syn : *A. sessilis* R. Br., Prodr. 417 (1810).
Karachi : Malir, under shade of mango garden, Oct. '51.
98. *Chenopodium album* L., Sp. Pl. 219 (1753).
Karachi : Mauripurside, along Lyari, 13.4.55 (869) ; Clifton, sandy ground, common, 20.4.56 (No. 1378).
99. *Atriplex Stocksii* (Wt.) Boiss., Diagn. II (iv), 73 (1859).
Syn : *Obione Stocksii* Wight, Icon. t. 1789 (1852).
100. *Suaeda nudiflora* (Willd.) Moq. in Ann. Sc. Nat. xxiii, 316 (1831).
Syn : *Salsola nudiflora* Willd., Sp. Pl. i, 1313 (1797).
101. *Pteropyrum Oliveri* Jaub. and Spach., Illustr. Pl. Or. ii, 9, t. 108 (1844).
Karachi : Near Dur Mohd. Gote, off Malir Cantt., sandy ground, 4.4.56 (No. 1303) ; Bund Murad, sandy grounds near the Hub river, 9.4.56 (No. 1371).
102. *Rumex dentatus* L., Mant. ii, 226 (1771).
Karachi : Weed in garden, Nov. '50.
103. *Euphorbia caducifolia* Haines in Indian Forester, xl, 154 (1914).
Syn : "*E. neriiifolia*" Auctt.—not of Linn.
104. *E. geniculata* Orteg., Nov. Pl. Hort. Matr. Dec. 18 (1797).
Karachi : Dur Mohd. Gote, along water channel and under shade, 4.4.56 (No. 1301).
105. *E. hirta* L., Sp. Pl. 454 (1753).
Syn : *E. pilulifera* L., l.c.
Karachi : Malir, Mango garden, Oct. '50 ! ; Memongote, garden weed!
106. *E. Clarkeana* Hooker f., Fl. Brit. Ind. v, 253 (1887).
Karachi : Clifton, sandy ground, 20.4.56 (No. 1407) ; near the Stadium, sandy ground, common, 6.5.56 (No. 1432).
107. *Phyllanthus Niruri* L., Sp. Pl. 981 (1753).
Karachi : Malir, mango garden, Oct. '50 ; Memongote, near cultivation, 4.4.56 (No. 1275).

108. *Chrozophora obliqua* A. Juss., Trent. Euphorb. 28 (1824).
Karachi : Malir, dry sandy beds of Malir river, rare, Sept. '55 !
109. *Ricinus communis* L., Sp. Pl. 1007 (1753).
Karachi : Malir ; Memongote ; Manora ; Drig Road.
110. *Vallisneria spiralis* L., Sp. Pl. 1015 (1753).
Karachi : Bund Murad, Hub river, abundant in water near shade, 11.11.51.
111. *Hydrilla verticillata* Prest., Bot. Bemerk. 112 (1844).
Karachi : College pond ; Gandhi garden pond.
112. *Asphodelus tenuifolius* Cav. in Ann. Cienc. Nat. iii, 46, t. 27 fig. 2 (1801).
Karachi : Malir, cult. fields, weed, 31.3.55 (No. 834).
113. *Commelina albescens* Hassk. in Schweinf., Beitr. Fl. Aethiop. 210 (1867).
Karachi : Along Lyari, sandy grounds, common, 15.3.55 (No. 824) ; Clifton, rocky and sandy ground near the parade, 18.11.56 (No. 1544) ; Mangopir, stony hillock, 18.7.56 (No. 1509).
114. *Juncus maritimus* Lamk., Encyc. Method. iii, 264 (1789).
Karachi : Bukhari Ghaus, rocky ground near the riverlet, common 9.4.56 (No. 1320).
115. *Phoenix dactylifera* L. Sp. Pl. 1188 (1753).
Karachi : Malir ; Beyond Mangopir.
116. *Zannichellia palustris* L., Sp. Pl. 969 (1753).
Karachi : Bund Murad, Hub river banks, April '50.
117. *Naias minor* All., Fl. Pedem. ii, 221 (1785).
Syn : *N. indica* Cham. in Linnaea iv, 501 (1829).
Karachi : Mangopir, common in a small pool, 27.12.56 (No. 1550).
118. *Juncellus laevigatus* (L.) Clarke in Fl. Brit. Ind. vi, 596 (1893).
Syn : *Cyperus laevigatus* L., Mant. ii, 179 (1771).
Karachi : Near Napier Baracks, Sept. '50 ! ; near Mangopir.
119. *Cyperus bulbosus* Vahl, Enum. ii, 342 (1806).
Karachi : Mangopir, sandy grounds, common after rains, 18.7.56 (No. 1521).
120. *C. rotundus* L., Sp. Pl. 45 (1753).
Karachi : Malir, Memongote ; College garden.
121. *Fimbristylis dichotoma* (L.) Vahl, Enum. ii, 287 (1806).
Karachi : Malir, near water, March '50.

122. *Poa annua* L., Sp. Pl. 68 (1753).
Karachi : Malir, near cultivation !
123. *Aeluropus lagopoides* (L.) Trin. in Thw., Enum. 374 (1864).
Syn : *Dactylis lagopoides* L., Mantiss. i, 33 (1767) ; *A. villosus* Trin., Fund. Agrost. 143 (1820).
124. *Eragrostis tenella* Roem. and Schult., Syst. ii, 576 (1817).
Karachi : College garden, flower pot weed ; Malir ; Memongote.
125. *E. poaeoides* Beauv., Agrost. 26 (1812).
Syn : *E. minor* Hochst., Pl. Austriac. i, 135 (1827).
Karachi : Memongote, cult. fields, 4.4.56 (No. 1290) ; Malir.
126. *E. pilosa* Beauv., l. c. 71.
Karachi : Mangopir !
127. *Eleusine compressa* (Forsk.) Ascherson and Schweinf. ex. C. Christensen in Dansk. Bot. Arkiv. iv (3), 12 (1922).
Syn : *Panicum compressum* Forsk., Fl. Aegypt-Arab. 18 (1775) ;
E. flagellifera Nees in Linnaea xiv, 220 (1842).
Karachi : Clifton, sandy ground, common, 18.11.56 (No. 1539).
128. *E. indica* Gaertn., Fruct. i, 8 (1788).
Karachi : Occasionally found in lawns and along water channels !
129. *Desmostachya bipinnata* Stapf in Dyer, Fl. Cap. vii, 639 (1900).
Karachi : Malir, sandy ground, 15.7.56 (No. 1499) ; Landhi.
130. *Dactyloctenium aegyptium* (L.) Beauv., Agrost. 72. Expl. Pl. I, 10 (1812).
Syn : *Cynosurus aegyptius* L., Sp. Pl. 72 (1753) ; *Elusine aegyptiaca* Desf., Fl. Atlant. i, 85 (1798).
Karachi : Widely occurs in cult. areas at Malir, Bund Murad.
131. *D. scindicum* Boiss., Diagn. ii (iv), 131 (1859).
Syn : *Elusine aristata* Ehrenb. in Boiss., Fl. Or. v, 557 (1881).
Karachi : Near Paradise point, sandy ground, common, 25.6.56 (No. 1485) ; Drig Road ! ; Bund Murad !
132. *Tetrapogon tenellus* Desf., Fl. Atlant. ii, 388, t. 255 (1799).
Syn : *Chloris tenella* (Desf.) Roxb., Fl. Ind. i, 329 (1832).
133. *T. villosus* Desf., l.c., 398, t. 255.
Syn : *Chloris villosa* (Desf.) Pers., Syn. i, 87 (1805).
Karachi : Mangopir, stony hillock, Sept. '51 !
134. *Chloris barbata* Sw., Fl. Ind. Occ. i, 200 (1797).
Karachi : Common in sandy soil at Nazimabad ! ; along Lyari ! ; Malir and Drig Road.

135. *Heleochoa dura* Boiss., Fl. Or. v, 477 (1881).
Karachi : Near Hawke's Bay, muddy road side, Jan. '50; Mauripur.
136. *Lolium temulentum* L., Sp. Pl. 83 (1753).
Karachi : Casually occurs in cult. fields at Sewage farm !
137. *Polypogon monspeliensis* Desf., Fl. Atlant. i, 66 (1798).
Karachi : Near cult. fields and water channels at Momongote ;
Malir ; Dur Mohd. Gote.
138. *Phalaris minor* Retz., Obs. iii, 8 (1786).
Karachi : Memongote, near cult. field. 4.4.56 (No. 1281) ; Malir !
139. *Phragmites karka* Trin. in Steud., Nom., 2 ed. ii, 324 (1841).
Karachi : Marshy place near Malir ; near Drig Rd.
140. *Tragus biflorus* Schult., Mant. ii, 205 (1767).
Karachi : Bund Murad, near cult. field, April '51 ; Malir, sandy
ground near cultivation.
141. *Aristida funiculata* Trin. and Rupr. in Mem. Acad. Petersb. VI, vi,
159 (1849).
Karachi : Bund Murad, sandy ground ; Drig Road , Mangopir.
142. *A. mutabilis* Trin. and Rupr., l.c. 150.
Karachi : Mangopir, stony hillock, Dec. '51 ! ; Drig Rd.
143. *A. depressa* Retz., Obs. iv, 22 (1786).
Karachi : Mangopir, stony hillock slopes, common, 27.12.56
(No. 1554).
144. *Digitaria adscendens* (H.B. & K.) Henr., Blumea 1, 92 (1934).
Syn : *Panicum adscendens* H. B. & K., Nov. Gen. et Sp. i, 97
(1815).
Karachi : Clifton, sandy and stony ground, 18.11.56 (No. 1543) ;
Memongote, cult. field, 4.4.56 (No. 1274).
145. *Digitaria nodosa* Parl., Pl. Nov. 39 (1842).
Karachi : Mangopir, stony hillock, common, 18.7.56 (No. 1512).
146. *Echinochloa colonum* (L.) Link, Hort. Berol. ii, 209 (1827).
Syn : *Panicum colonum* L., Syst., 10 ed., 870 (1759).
Karachi : Clifton, sandy wet ground, 18.11.56 (No. 1529) ; Malir.
147. *Brachiaria ramosa* (L.) Stapf in Prain, Fl. Trop. Afr. ix, 542 (1919).
Syn : *Panicum ramosum* L., Mant. 29 (1767).
Karachi : Mangopir, sandy ground, 9.4.56 (No. 1328).
148. *B. distachya* (L.) Stapf., l.c. 565.
Syn : *Panicum distachyum* L., Mant. i, 138 (1767).

- Karachi : Mauripur side, along Lyari, muddy borders of water channel, saline and wet, 13.4.55.
149. *Cenchrus pennisetiformis* Hochst. in Steud., Nom. 2 ed., i, 317 (1840).
Syn : *Pennisetum cenchroides* Rich in Pers., Syn. i, 72 (1805).
150. *C. setigerus* Vahl, Enum, ii, 395 (1806).
Syn : "*C. biflorus*" Hooker, Fl. Brit. Ind. vii, 89 (1896)—not of Roxburgh.
151. *Sctaria verticillata* Beauv., Agrost. 51 (1812).
Karachi : Memongote, cult. fields, 4.4.56 (No. 1292) ; Malir ; Sewage farm, near cult. fields !
152. *Elionurus Royleanus* Nees in A. Rich, Trent. Fl. Abyss. ii, 471 (1851).
Karachi : Mangopir, stony hillock, common, 27.12.56 (No. 1559).
153. *Lasiurus hirsutus* (Vahl) Boiss., Diagn. II (iv), 146 (1859).
Syn : *Rottboellia hirsuta* Vahl, Symb. i, 11 (1790) ; *Elionurus hirsutus* (Vahl) Munro ex Benth. in Journ. Linn. Soc. xix, 68 (1881).
Karachi : Mangopir, stony hillock, 18.7.56 (No. 1507) and 27.12.56 (No. 1556) ; Nazimabad, along Lyari, sandy ground ; Drig Road.
154. *Dichanthium annulatum* (Forsk.) Stapf in Prain, Fl. Trop. Afr. ix, 178 (1919).
Syn : *Andropogon annulatus* Forsk., Fl. Aegypt-Arab. 173 (1775).
Karachi : Common almost throughout the year along watered places cult fields ! ; Paradise point, near cult. field, 25.6.56 (No. 1488) Malir ; Memongote ; Drig Road.
155. *Cymbopogon jwarancusa* Schult., Mant. ii, 458 (1767).
Syn : *Andropogon jwarancusa* (Schult.) Jones in As. Res. iv, 109. (1795).
156. *C. schoenanthus* Spreng., Pugill. ii, 15 (1815).
Karachi : Drig Rd. stony mound, Mangopir.
157. *Chrysopogon Aucheri* (Boiss.) Stapf in Kew Bull. 211 (1907).
Syn : *Andropogon Aucheri* Boiss., Diagn. iv, 77 (1844).
158. *Eremopogon foveolatus* (Del.) Stapf in Prain, Fl. Trop. Afr. ix, 182 (1919).
Syn : *Andropogon foveolatus* Del. Descrip. de l'Egypt, 160, t. 8, fig. 2 (1812).
Karachi : Near the stadium, stony mound, common, 6.5.56 (No. 1415) ; Paradise point, 25.6.56 (No. 1490).

Ueber einige neue oder bemerkenswerte Ascomyceten aus Pakistan III.

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Wieder haben sich im Laufe unserer Untersuchung pakistanischer Pilze einige interessante, neue Funde ergeben, die im Folgenden beschrieben werden sollen :

19. *Diaporthe indigoferae* nov. spec.

Stromata late effusa ordines longitudines formata, superficiem matricis irregulariter nigrificans, intus linea stromatica lateraliter manifesta. Perithecia irregulariter laxe dispersa vel raro 2—vel 3—aggregata, ligno profunde immersa, globosa vel late ellipsoidea vix vel parum depressa, 350-450 diam. ; ostiolo plus minusve cylindraceo, ca 100 crasso, canali periphysati perforato, superficiem erumpentio. Pariete perithecorum tenuiter membranaceo, 12-15 μ crasso, pseudoplectenchymatico, pallide griseo-brunneo, cellulis plus minusve compressarum formato. Asci numerosissime, unitunicati, subfusoidi, breviter stipitati, 40-50 x 6-7 μ , 8-spori. Sporae hyalinae, plus minusve distichae, fusoidae vel cylindraceae, rectae vel saepe curvatae, 9-11 x 2-2,5 μ , 1-3-septatae et leniter constrictae. Paraphyses raras, mox omnino mucosae.

Hab. in ramis emortuis *Indigoferae gerardianae* Wall.—Pakistan : Murree Hills, Changla gali, 14. 8. 1954, leg. S. Ahmad.

Der Pilz bildet im Substrat weit ausgebreitete, oft auch in Längsreihen hintereinander angeordnete Stromata, welche oben und seitlich deutlich, an der Basis nur selten und dann undeutlich von einer dunklen Saumlinie begrenzt sind. Das Substrat ist an der Oberfläche nur unwesentlich geschwärzt, zuweilen allerdings breiten sich von den manchmal etwas vorstehenden Mündungen schwarze Stromakomplexe über die Substratoberfläche aus. Die Fruchtkörper sind dem Holz tief eingesenkt. Sie sind kugelig, breit ellipsoidisch oder zuweilen auch etwas zusammengedrückt oder durch gegenseitige Beeinflussung auch seitlich etwas abgeflacht, 350-450 μ gross, oft sehr weit zerstreut, dann aber auch wieder zu wenigen miteinander vergesellschaftet. Die mehr oder weniger zylindrischen, oft stark gekrümmten und in ihrem Verlauf sehr variablen,

verschieden dicken, zuweilen bis $100\ \mu$ breiten Mündungen sind von einem ziemlich engen, stark mit Periphysen besetzten Kanal durchbohrt; sie brechen einzeln oder zu wenigen miteinander vereinigt durch die Substratoberfläche und stehen dort oft auch etwas vor. Von ihnen aus ziehen sich mehr oder weniger zahlreiche dunkle stromatische Komplexe in das umliegende Holz, sich hier nach und nach verlierend. Die Fruchtkörperwand ist $12\text{--}15\ \mu$ dick, graubraun gefärbt, aussen von einer Schicht aus $4\text{--}7\ \mu$ grossen, ziemlich derbwandigen, braunen, nur wenig zusammengepressten Zellen begrenzt, im übrigen aber aus einigen Lagen von deutlich zusammengepressten, bis $14\ \mu$ langen und $2\text{--}3\ \mu$ breiten, hyalinen, nicht sehr derbwandigen Zellen aufgebaut. Bei der Mündung des Fruchtkörpers biegt die Wand oft zunächst deutlich nach unten durch.

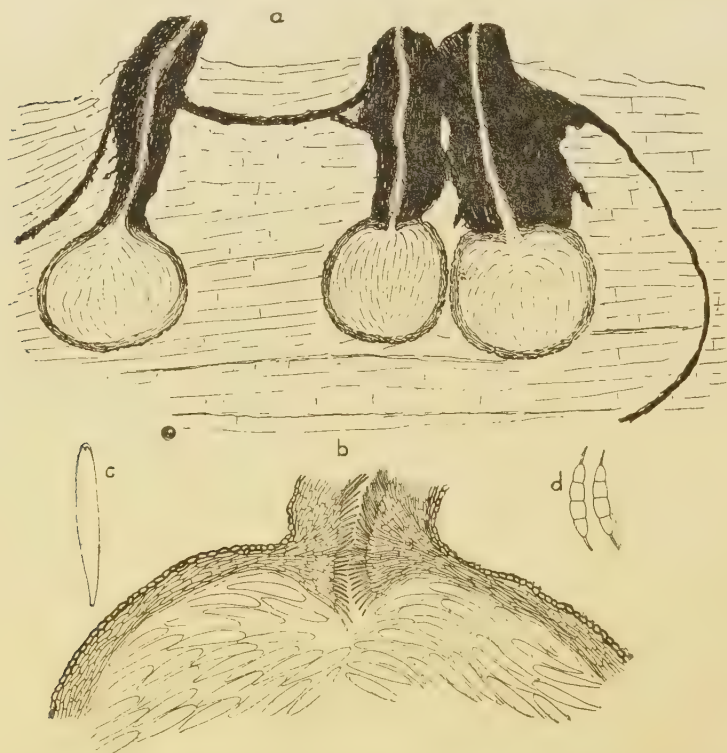


Abbildung 1. *Diaporthe indigoferae*. a) Schnitt durch eine Stromapartie Vergr. ca. $50\times$. b) Schnitt durch eine Fruchtkörperpartie Vergr. ca. $250\times$. c) Ascosporen Vergr. $1000\times$.

Die sehr zahlreichen Asci sind mehr oder weniger zylinderisch-spindelförmig, zartwandig, nur oben mit einem Apikalring versehen, $40\text{--}50'$

x 6–7 μ gross, unten kurz gestielt und sich relativ früh von der Wand lösend. In reifen Fruchtkörpern füllen die Asciden ganzen Peritheciinnenraum aus. Paraphysen sind nur spärlich vorhanden: sie sind fädig, hyalin und lösen sich bald schleimig auf. Die zu je acht mehr oder weniger zweireihig im Ascus liegenden Sporen sind spindelförmig oder undeutlich zylinderisch, gerade oder meist etwas gekrümmt, beidendig mit einem hyalinen Schleimspitzchen versehen, 1– bis 3– mal septiert und an den Querwänden meist auch schwach eingeschnürt, hyalin, 9–11 x 2–2,5 μ gross.

Diaporthe indigoferae stimmt im Aufbau ihrer Stromata mit der deutlich sichtbaren schwarzen Saumlinie, im Bau der Fruchtkörper und in den Asci genau mit der Gattung *Diaporthe* überein. Eine Abweichung besteht nur insofern als die Ascosporen meist nicht nur einmal sondern bis drei Mal septiert sind.

20. **Nodulosphaeria setosa** nov. spec.

Perithecia dispersa, ligno plus minusve immersa, globosa, vel leniter depressa, 350–500 μ diam. hyphis fuscis ornata; ostiolum cylindraceum vel conicum, setis fuscis, rigidis, cellulatis ornatum, canali pseudoperiphysati perforatus. Pariete peritheciorum 20–30 μ crassus, fuscus, cellulis 10–15 diam. plus minusve compressis compositus. Asci numerosi, bitunicati, cylindracei, 120–150 x 10–11 μ , stipitati, 8–spori, paraphysoides fibroses circumdati. Sporae filiformae, fuscae, 65–80 x 2,5–3 μ , 9–12–cellulatae, cellula quarta, quinta vel sexta in extremo inferior nodulosa.

Hab. in ramis emortuis *Sambuci Ebuli* Linn.—Pakistan: Kagan Valley, Naran, 3.8.1956, leg. S. Ahmad.

Die kugeligen oder meist schwach niedergedrückten, 350–500 μ grossen, aussen stark mit bräunlichen, septierten Hyphen bekleideten Fruchtkörper wachsen meist einzeln unter der Rinde, werfen diese aber oft ab und sind dann nur noch wenig dem Holz eingesenkt. Am Scheitel ist ihnen eine zylinderische oder kegelförmige Mündung aufgesetzt, welche aussen steife, an der Basis 5–6 μ dicke, sich nach oben schwach verjüngende, unten braune gegen oben nur noch schwach gefärbte, zellige Borsten trägt und innen von einem ziemlich breiten Kanal durchbohrt ist, in den hinein zahlreiche, dicht parallel nebeneinander stehende, hyaline, breit hyphige, periphysenartige Zellen ragen. Die 20–30 μ dicke Fruchtkörperwand besteht aus mehr oder weniger stark plattenförmigen, 10–15 μ grossen, bräunlichen Zellen. Seitlich und im Mündungsbereich sind diese ziemlich derbwandig und darüber hinaus noch mit sehr dunklem Pigment inkrustiert; im Bereich der Basis sind die Zellwände heller und nicht inkrustiert.

Die zylinderischen, unten deutlich gestielten, dick- und doppelwandigen, 120–150 x 10–11 μ grossen, achtsporigen Asci stehen der

ganzen innern Wand entlang. Sie sind von dünnen, fädigen, undeutlich schleimigen Paraphysoiden umgeben. Die Ascosporen sind fädig, braun, $65-80 \times 2,5-3 \mu$ gross, beidendig verjüngt, 9— bis 12-zellig, an der 4., 5. oder 6. Zelle unten deutlich angeschwollen und im Ascus meist schwach gedreht angeordnet.

Der vorliegende Pilz gehört zu der Gruppe von Ascomyceten, welche noch vor kurzem in der Gattung *Ophiobolus* Riess zusammengefasst war. Nun hat aber Holm (1957) gezeigt, dass die Gattung *Ophiobolus* Riess sich in verschiedene Formenkreise trennen lässt, welche teilweise mit Formenkreisen der alten Gattung *Leptosphaeria* Ces. et de Not. zusammenfallen. Er hat es daher vorgezogen, diesen Formenkreisen den

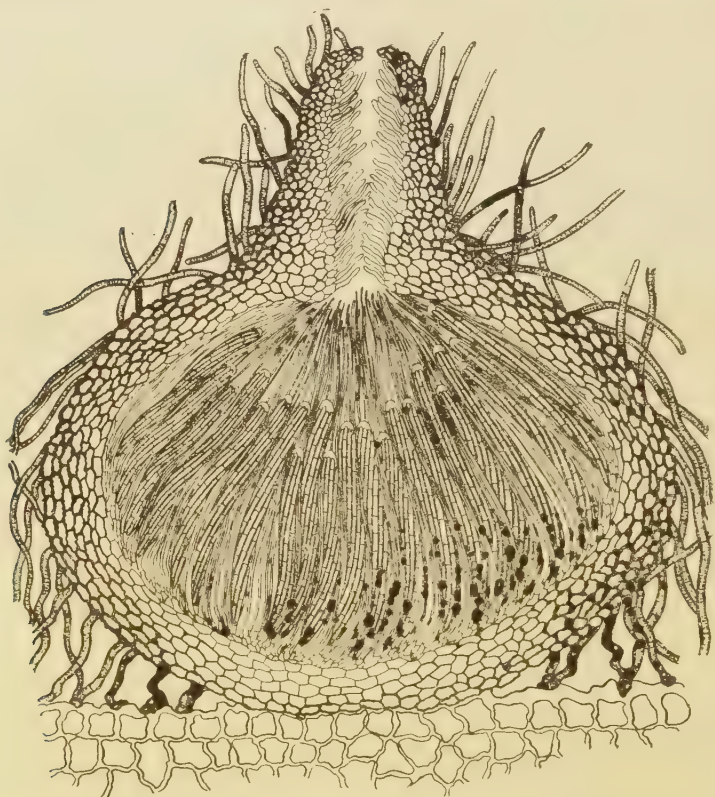


Abbildung 2. Schnitt durch einen Fruchtkörper von *Nodulosphaeria setosa* Vergr. 250 x.

Rang von Gattungen zu geben, wobei er in allen Fällen auf ältere, bisher in die Synonymie verwiesene Namen zurückgreifen konnte. Die ganze Gattungsgruppe mit *Leptosphaeria* Ces. et de Not., *Melanomma* Nit., *Ophiobolus* Riess, *Trematosphaeria* Fuek., *Massarina* Sacc. und

Trichometasphaeria Munk wurde einer kritischen Untersuchung unterzogen und die in Frage stehenden Arten neu geordnet. Wenn auch noch eine ganze Reihe von Fragen dabei ungelöst blieben und nur ein Teil der Arten richtig eingeordnet wurde, so bedeutet diese Arbeit doch einen guten Schritt gegen eine natürliche Ordnung des Formenkomplexes.

Die nächsten Verwandten von *Nodulosphaeria setosa* sind zweifellos *Nodulosphaeria cirsii* (Karst.) L. Holm und *Nodulosphaeria pontica* (Petr.) L. Holm. *Nodulosphaeria cirsii* besitzt längere und dickere, durch mehr Quersepten unterteilte Sporen, während *Nodulosphaeria pontica* nur etwas breitere Sporen hat, daneben aber fast kahle Fruchtkörper besitzt. Im Gegensatz dazu ist die vorliegende Form stark hyphig behaart.

21. *Trematosphaeria indigoferae* nov. spec.

Perithecia sub cortice nascentia, globosa vel plus minusve depressa, 350–550 μ diam., apicaliter capali pseudo-periphysati aperta. Pariete perithecorum apicaliter 70 μ lateraliter 30–40 μ crassus, cellulis polyedricis, 8–14 μ diam. plus minusve opace fuscis compositus. Asci cylindranei vel clavati, 110–130 $\times$ 15–18 μ , bitunicati, stipitati, 8-spori, paraphysoides fibroses circumdati. Sporae 34–42 $\times$ 7,5–10,5 μ , fusoideae, primo hyalinae deinde fuscae, 3-septatae et constrictae, cellula secunda nodosa.

Hab. in ramis emortuis *Indigoferae gerardianae* Wall.—Pakistan: Kagan Valley, Shogran, 28.7.1956, leg. S. Ahmad (sub. Nr. 14078)

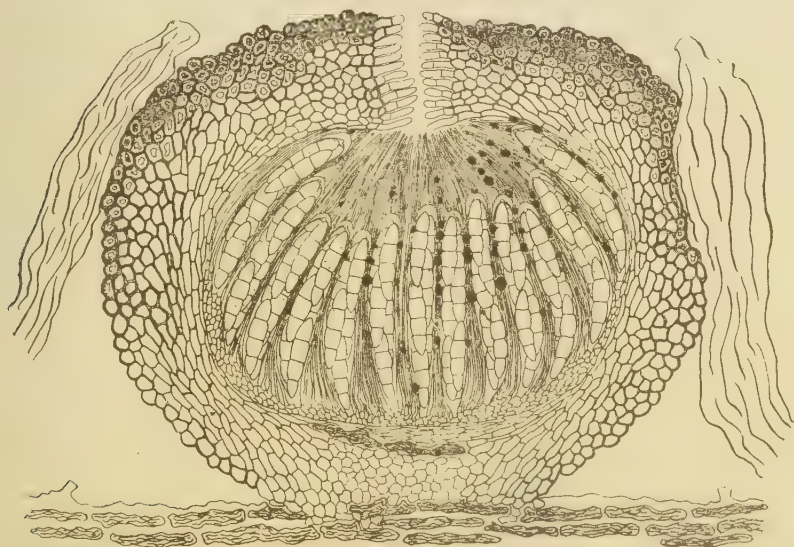


Abbildung 3. Schnitt durch einen Fruchtkörper von *Trematosphaeria indigoferae*.
Vergr. 250 x.

Die kugeligen oder schwach niedergedrückten, unter der Rinde sitzenden, 350–550 μ grossen Fruchtkörper wachsen in mehr oder weniger unterbrochenen Längsreihen. Am Scheitel öffnen sie sich mit einem engen Kanal, in den hinein bis 5 μ breite, hyaline, zartwandige, dicht parallel nebeneinander stehende Hyphen ragen. Die Fruchtkörperwand ist am Scheitel gegen 70 μ dick, seitlich und an der Basis wird sie etwas dünner und besitzt an der dünnsten Stelle noch 30–40 μ Mächtigkeit. Sie ist aus 8–14 μ grossen, mehr oder weniger regelmässig polyedrischen, aussen sehr derbwandigen, an den Wänden und im Lumen stark dunkel inkrustierten, gegen das Innere zartwandigern, hellern Zellen aufgebaut. An den Seitel werden die Zellen im Innern nach und nach gestreckt und zuletzt plattenförmig flach; sie ordnen sich in parallele Schichten, welche an der Basis mehr oder weniger senkrecht zur Substratoberfläche enden. An der Basis sind die Wandzellen heller, manchmal fast hyalin und zartwandig. Oft sind in der Wand auch noch Substratreste miteingeschlossen.

Die 110–130 x 15–18 μ grossen Asci sind dick- und doppelwandig, unten deutlich gestielt und sie enthalten je acht zweireihig angeordnete Ascosporen. Umgeben sind sie von fädigen, hyalinen, deutlich zelligen Paraphysoiden. Die Ascosporen sind spindelig, 34–42 x 7,5–10,5 μ gross, lange hyalin, sich aber später deutlich hellbraun färbend zunächst durch eine mittlere Zellwand zweizellig, sich später in jeder Hälfte nochmals teilend und zuletzt deutlich vierzellig mit angeschwollener zweiter Zelle, anfänglich auch mit einer später zerfliessenden Schleimhülle umgeben.

22. *Xylosphaeria pakistani* nov. spec.

Stromata ligno immersa, tuberosa, nigra, perithecii solitari contacta. Perithecia globosa vel depressa, 800–1000 μ latitudine, 650–850 μ altitudine, apicaliter late aperta, clypeo nigro tecta. Pariete peritheciorum 60–80 μ crassus, cellulis 9–14 μ diam. pallide fuscis, leniter depressis formatus. Asci cylindracei, bitunicati, 180–210 x 18–23 μ , breve stipitati, 8–spori, paraphysoides hyalines fibrosis circumdati. Sporae late ellipsoideae, media constrictae, fuscae, 22–32 x 11,5–14 μ , muriformiter septatae, septis transversalis 7, vel rare 5–6, septis longitudinalis variabilis.

Hab. in ramis emortuis *Astragalus* spec. Pakistan: Kagan Valley, Shogran, 3.8.1956, leg. S. Ahmad.

Die dem nackten Holz eingewachsenen, einzelstehenden oder zu wenigen miteinander verwachsenen, meist deutlich knollig vorstehenden, schwarzen, zuweilen in Längsreihen hintereinander auftretenden Fruchtkörper sind kugelig oder deutlich niedergedrückt, 800–1000 μ breit und 650–850 μ hoch. Am Scheitel sind sie mit einer ziemlich weit offenen, rundlichen Mündung versehen; von den diese umgebenden Wandpartien

aus zieht sich ein dunkler, manchmal ziemlich dünner, oft aber mächtig entwickelter Klypeus ausserhalb des Fruchtkörpers nach unten. Er besteht aus 5-8 μ grossen, derbwandigen, rundlichen, sehr dunkel gefärbten Zellen. Die Fruchtkörperwand ist 60-80 μ dick und besteht aus ziemlich hell gefärbten, bräunlichen, zuweilen auch subhyalinen, schwach zusammengedrückten, 9-14 μ grossen, nicht sehr dickwandigen Zellen. Nur im Bereich der Mündung sind die Wandzellen mit derbern Wänden versehen und dunkel gefärbt. Klypeus und Wand schliessen zuweilen Substratrete ein, sodass manchmal komplizierte Durchdringungen von Pilz und Wirt entstehen.



Abbildung 4. Schnitt durch einen Fruchtkörper von *Xylosphaeria pakistani*
Vergr. 100 x.

Die zylinderischen, dick- und doppelwandigen, 180-210 x 18-23 μ grossen Asci stehen dicht parallel nebeneinander. Sie sind am Scheitel breit abgerundet und am Grunde kurz, aber deutlich gestielt und von zahlreichen, fädigen, hyalinen Paraphysoiden umgeben. Sie enthalten je acht, schräg einreihig angeordnete, breit ellipsoidische, zuweilen an den Enden aber auch deutlich verjüngte, goldbraun gefärbte, 22-32 x 11,5-14 grosse Sporen, welche in der Mitte deutlich eingeschnürt sind und durch meist 7, zuweilen aber auch nur 5-6 Querwände und überdies durch eine von Querwand zu Querwand wechselnde Zahl von Längswänden septiert sind.

Die Gattung *Xylosphaeria* Otth. wurde—in einer gegenüber dem



Abbildung 5. Ascosporen von a) *Nodlosphaeria setosa* b) *Trematosphaeria indigoferae* c) *Xylosphaeria pakistani* Vergr 1000 x.

ersten Autor etwas revidierten Umschreibung—von Petrak (1950) an Stelle von *Thyridium* Nitschke gesetzt, weil dieser Gattungsname nicht aufrecht erhalten bleiben kann wegen der ältern Moosgattung *Thyridium* Mitt. Trotzdem bleibt die ganze Gruppe sehr unübersichtlich und muss noch einer eingehenden Revision unterzogen werden. Der Gattungstypus von *Thyridium* Nit. *Thyridium vestita* (Fr.) Nit. soll nämlich nach Petrak (1950) eine *Fenestella* Tul. sein; in Tat und Wahrheit handelt es sich aber um einen sphaerial gebauten Pilz, der nichts mit *Fenestella* zu tun hat. Auch *Xylosphaeria* Otth. ist vorderhand nicht abgeklärt, da der Autor schon wahrscheinlich verschiedene Typen dazu gestellt hat.

Trotz dieser unsichern Sachlage möchte ich den vorliegenden Pilz zu *Xylosphaeria* Otth. emend. Petr. stellen, weil sehr umfassende und zeitraubende Untersuchungen notwendig sind, um die Verhältnisse innerhalb der unübersichtlichen Pilzgruppe genau abzuklären.

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 Petrak, F. (1950)—in Esfandiari, E. und Petrak, F.—Pilze aus Iran, Sydowia **4**, 11–53.

Key to the Indomalayan Termites

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INTRODUCTION

Since the publication of the monograph of the termites of the Indomalayan region by Holmgren (1913) the number of termite species reported from this region has more than doubled. Snyder lists 416 Indomalayan species in his catalogue published in 1949. Since then another 18 species have been described (Ahmad, 1953; Roonwal, 1953; Ahmad, 1955, 1955a; Roonwal and Krishna, 1955; Roonwal and Sen-Sarma, 1956 and Krishna, 1956), bringing the total number to 434. This number includes species of *Archotermopsis*, *Hodotermopsis* and *Reticulitermes*, which are, strictly speaking, palaearctic in distribution (Emerson, 1955). Included in the present key are 394 species, represented by 225 imagoes and 359 soldiers. Cases of synonymy and of doubtful identification are discussed briefly under footnotes.

In order to be of maximum utility to the students of termite taxonomy the key has been made very comprehensive. The primary characters, appearing in italics, are followed by supplementary characters to enable the identification of a species without referring to its original description as far as possible. In many cases measurements of new characters are included. A work of this type could not be accomplished without a good collection of the material and literature, for both of which I am greatly indebted to Professor Alfred Emerson of the University of Chicago.

TERMS AND MEASUREMENTS

The first tooth of the imago-worker mandible is designated as the apical tooth and the rest as the marginal teeth which in primitive type of mandibles like those of a rhinotermitid are further distinguished as the first, second and third marginal teeth (Emerson, 1933 ; Ahmad, 1950). The two sides of the marginal tooth are referred to as the anterior and posterior cutting edges. The small tooth at the base of the anterior cutting edge of the right mandible as seen in *Archotermopsis* and the rhinotermitids is called subsidiary tooth.

The Indomalayan region, also called Oriental region, includes the tropical and subtropical parts of the continent of Asia from West Pakistan in the west to Weber's Line west of Moluccas in the east.

The measurements of the soldiers, formerly regarded as major and minor on the basis of slight differences in size alone, have been combined. The measurements by the present author are given within brackets to differentiate them from those of other authors whose source is indicated in each case. All the measurements are in millimetres.

KEY TO THE FAMILIES

Imagoes

1. Fontanelle absent 2
 Fontanelle present 3
2. Ocelli absent ; right mandible with a small subsidiary tooth at the base of the anterior cutting edge of the first marginal tooth (subsidiary tooth reduced in *Hodotermes*, *Microhodotermes* and *Anacanthotermes*); left mandible with three marginal teeth (second marginal tooth much reduced in *Hodotermes*, *Microhodotermes* and *Anacanthotermes*) ; cerci long, with 3-8 articles **Hodotermitidae**
 Ocelli present ; right mandible never with a subsidiary tooth ; left mandible with two marginal teeth ; cerci short, with 2 articles
 **Kalotermitidae**
3. Fontanelle without plate; right mandible with a distinct subsidiary tooth at the base of the anterior cutting edge of the first marginal tooth; left mandible always with three marginal teeth; forewing scales large, overlapping the hindwing scales (except in *Reticulitermes* and *Psammotermes*) ; wing membrane reticulate **Rhinotermitidae**

Fontanelle with plate ; right mandible with a minute subsidiary tooth
 in some of the primitive fungus growing genera and in *Protohamitermes* ;
 left mandible with 1-2 marginal teeth (except in *Protohamitermes*) ;
 forewing scales small, not overlapping the hindwing scales (except in
Serritermes) ; wing membrane not reticulate (except in *Serritermes*)
 **Termitidae**

Soldiers

1. Head without fontanelle and frontal gland ; eyes present, about the
 size of the base of the antennae ; mandibles with prominent marginal
 teeth **2**
 Head with fontanelle and frontal gland ; eyes if present, dot-like, much
 smaller than the base of the antennae ; mandibles with or without
 marginal teeth **3**
2. Cerci long, with 3-8 articles ; antennae with 22-23 articles (*Stolotermes*
 and *Porotermes* with fewer articles) ... **Hodotermitidae**
 Cerci short, with 2 articles ; antennae with 10-18 articles ...
 **Kalotermitidae**
3. Pronotum flat **Rhinotermitidae**
 Pronotum saddle-shaped (except in *Serritermes*) ... **Termitidae**

Family KALOTERMITIDAE

KEY TO THE GENERA

Imagoes

1. Anterior cutting edge of the second marginal tooth of the left mandi-
 ble nearly twice as long as the posterior cutting edge of the first
 marginal tooth ; median vein joined to radius sector about the centre
 of the wing **Cryptotermes**
 Anterior cutting edge of the second marginal tooth of the left mandible
 almost as long as the posterior cutting edge of the first marginal
 tooth ; median vein extending up to the apex of the wing ... **2**
2. Radius sector without any branches to the costal margin of the wing ;
 median vein as strongly sclerotized as radius sector and radius ; wing
 membrane stippled **Glyptotermes**
 Radius sector with several branches to the costal margin of the wing ;
 median vein not as strongly sclerotized as radius sector and radius
 **3**

3. Median running midway between cubitus and radius sector ...
 **Kalotermes**
 Median running nearer to radius sector than to cubitus
 **Neotermes**

Soldiers

1. Head phragmotic, short, thick, truncated in front, adapted for plugging
 holes in the nest, almost black anteriorly ; mandibles comparatively
 short **Cryptotermes**
 Head not phragmotic, elongated, mandible comparatively long ... 2
 2. Forehead steep, somewhat lobed **Glyptotermes**
 Forehead not steep, not lobed **Kalotermes &**
Neotermes

Genus *KALOTERMES* Hagen

KEY TO THE SPECIES

Imagoes

1. *Pronotum distinctly wider than the head (difference between pronotum
 width and head width 0.46) ; head longer than wide, oval ; ocelli
 almost touching the eyes ; antennae with 19 articles, the second some-
 what longer than the third, the third almost as long as the fourth ;
 head width 1.44 ; pronotum length 1.14, width 1.90 ; length of fore-
 wing 10.00. (Holmgren, 1913) **K. indicus** Holmgren*

Pronotum slightly wider than the head (difference between pronotum
 width and head width 0.07-0.27) 2

2. Pronotum width 1.55-1.80 3
 Pronotum width 1.27-1.38 4

3. *Difference between pronotum width and head width 0.15-0.19 ; head almost
 round ; eyes not quite round, anterior margin rather straight ; ocelli
 oval, touching the eyes obliquely ; antennae with 16-18 articles, the
 second nearly twice as long as the third, the fourth slightly shorter
 than the third ; pronotum shallowly concave anteriorly, nearly
 straight posteriorly ; head length to tip of labrum 1.51-1.81, with-
 out mandibles 1.18-1.56, width 1.36-1.51 ; long diameter of eye
 0.48-0.59 ; ocellus length 0.18-0.25, width 0.14-0.20 ; pronotum
 length 0.68-0.79, width 1.55-1.68 (Ahmad, 1955a)
 **K. beesoni** Gardner*

*Difference between pronotum width and head width 0.27 ; head parallel-
 sided ; eyes rather flat ; ocelli round, approaching the eyes closely ;*

antennae with 19 articles, the third and fourth subequal; pronotum broadly but shallowly concave anteriorly, with a shallow median concavity in the posterior margin; head length to tip of labrum 1.80, without mandibles 1.35, width 1.53; diameter of eye 0.45; diameter of ocellus 0.18; pronotum length 1.15, width 1.80; length of forewing 9.00. (Light, 1930) ... **K. mcgregori** Light

4. *Head distinctly longer than wide, yellowish; ocelli touching the eyes; eyes slightly bulging; antennae with 15-17 articles, the third longer than the second and more strongly sclerotized, in specimens with 17 articles the third as long as the second; pronotum broad kidney-shaped; head width 1.16-1.20; pronotum length 0.74-0.77, width 1.27-1.31.* (Kemner, 1932) ... **K. pinto** Kemner

Head slightly longer than wide, dark brown; ocelli close to but not touching the eyes; eyes bulging; antennae with 15-16 article; pronotum shallowly concave anteriorly, straight posteriorly; head length without mandibles 1.45-1.50, width 1.27-1.31; pronotum width 1.38 (Kemner, 1932) ... **K. jepsoni** Kemner

Soldiers

1. Mandibles with a prominent basal hump ... 2
Mandibles with weakly developed basal hump ... 3
2. *Pronotum wider, width 1.91-2.29, shallowly concave anteriorly, antero-lateral corners broadly rounded; eyes oval, as long as the scape of the antenna; postmentum twice as wide in front as in the middle; antennae with 11-14 articles, the third obconic, strongly sclerotized, as long as the fourth and fifth combined, the second half as long as the third; head length with mandibles 3.15-4.01, without mandibles 2.02-2.47, width 1.57-1.95; pronotum length 0.86-1.12.* (Ahmad, 1955a) ... **K. beesoni** Gardner

Pronotum narrower, width 1.69-1.75, deeply concave anteriorly, antero-lateral corners narrowly rounded; eyes slightly arched; antennae with 13 articles, the third obconic, dark brown, nearly twice as long as the second; head length with mandibles 3.54-3.75, without mandibles 2.30, width 1.55-1.59. (Kemner, 1932) ... **K. pinto** Kemner

3. *Width of head 1.75-(1.83-1.94); eyes white, broadly oval, separated from the antennal foveolae by less than their width; antennae with 15-17 articles, the third slightly less than the fourth and fifth combined, obconic, strongly sclerotized; pronotum deeply concave anteriorly, antero-lateral corners narrowly rounded, almost straight*

posteriorly, with a slight median concavity; head length with mandibles 3.00(3.27)–(3.31)4.25, without mandibles 2.00(2.12)–(2.30) 2.50; eye length (0.21), width (0.18); postmentum length (1.33), widest width (0.64–0.68), narrowest width (0.14); pronotum length 1.10(1.11)–(1.18)1.26, width (1.98) 2.00–2.25 (2.26), depth of anterior concavity (0.32). (Light, 1921)

... .. **K. mcgregori** Light
Width of head 1.15–1.48 4

4. *Larger species*; head length without mandibles 2.30–2.58; antennae with 14 articles, the third one-and-a-half times to twice as long as the second, thicker, not quite obconic; pronotum shallowly concave anteriorly, with a small notch in the middle; antero-lateral corners broadly rounded; head length with mandibles 3.65–4.04, width 1.34–1.48; pronotum length 0.77–0.85, width 1.27–1.40. (Kemner, 1932)

... .. **K. jeponseni** Kemner
Smaller species; head length without mandibles (1.51)–1.80, eyes oval, whitish, separated from the antennal foveolae by their width; antennae with 13–14 articles, the third as long as the fourth and fifth combined, strongly sclerotized, obconic; pronotum deeply bilobed anteriorly, lobes narrowly rounded, sides almost parallel, posterior margin nearly straight; head length with mandibles (2.43), width (1.15)–1.17; eye length (0.14), width (0.09); postmentum length (1.08), widest width (0.43); pronotum length (0.72), width (1.15)–1.30, depth of anterior concavity (0.25). (Light, 1930)
... .. **K. taylori** Light

Genus *NEOTERMES* Holmgren

KEY TO THE SPECIES

Imagoes

1. *Head width* 2.26; head oval, thick; eyes large, somewhat bulging; ocelli almost touching the eyes; antennae with 20 articles, the second, third and fourth subequal; labrum as long as wide; pronotum length 1.31, width 2.37; length of forewing with scale 19.60, without scale 18.00. (Kemner, 1930)
... .. **N. longipennis** Kemner
Head width not exceeding 2.16 2
2. *Pronotum nearly one-and-a-half times the width of the head*; ocelli almost in contact with the eyes; antennae with 18–19 articles, in

- specimens with 19 articles the second and third subequal, the fourth slightly shorter, in specimens with 18 articles the second, third and fourth subequal; labrum slightly wider than long; pronotum strongly concave anteriorly; head width 2.05; pronotum length 1.29, width 3.08. (Holmgren, 1913) ... **N. militaris** (Desneux)
- Pronotum comparatively narrow ... 3
3. Head width 2.10-2.16 ... 4
- Head width 1.48-2.02 ... 5
4. *Pronotum distinctly wider than the head (difference between pronotum width and head width 0.18)*, broadly concave anteriorly, nearly straight posteriorly, with an indistinct median concavity; head length to tip of labrum 2.34, without mandibles 1.82, width 2.16; diameter of eye 0.64; diameter of ocellus 0.27; pronotum length 1.24, width 2.34. (Light, 1930) ...
- ... **N. parviscutatus** (Light)
- Pronotum indistinctly wider than the head (difference between pronotum width and head width 0.05)*; head light castaneous brown; eyes not round, separated from the lower margin of the head by less than half their diameter; ocelli suboval, close to but not touching the eyes; antennae with 15 articles, the third shorter than the second but longer than the fourth; pronotum broadly but shallowly emarginate anteriorly, very slightly emarginate posteriorly; head length to tip of labrum 2.40, width 2.10; long diameter of eye 0.60; pronotum length 1.30, width 2.15. (Snyder, 1934) ... **N. bosei** (Snyder)
5. Pronotum distinctly wider than the head (difference between pronotum width and head width 0.11-0.32) ... 6
- Pronotum as wide as or only slightly wider than the head (difference between pronotum width and head width less than 0.10) ... 12
6. *Pronotum narrower, width 1.69*; head light reddish brown, sparsely hairy; eyes prominent, round; ocelli broadly oval; antennae with 19 articles, the second slightly longer than the third, the third nearly one- and-a-half times as long as the fourth; head length to tip of labrum 1.80, without mandibles 1.26, width 1.54; long diameter of eye 0.54, short diameter 0.52, distance from the lower margin of the head 0.23; ocellus length 0.21, width 0.18, distance from the eye 0.05; pronotum length 0.93 ...
- ... **N. malatensis** (Oshima) *
- Pronotum wider, width 1.80-2.15 ... 7

*Hitherto unknown caste.

7. Third antennal article longer than the second ... 8
 Third antennal article as long as or shorter than the second ... 9
8. *Difference between head width and pronotum width 0.08-0.15*; head dark reddish brown, densely hairy; eyes not bulging, small, slightly concave anteriorly; ocelli longer than wide, very close to the eyes; antennae with 18-21 articles; pronotum broadly but deeply notched anteriorly, straight posteriorly; wing membrane brown, subcosta extending up to the basal third of the wing; head width 1.77-1.87; pronotum length 1.02-1.06, width 1.92-1.95. (Kemner, 1934) ... **N. sonneratae** Kemner
- Difference between pronotum width and head width 0.24*; head slightly longer than wide; eyes small; ocelli touching the eyes; third antennal article longer than the second and fourth; pronotum deeply emarginate anteriorly, very slightly so posteriorly; head width 1.77; pronotum length 1.09, width 2.01. (Kemner, 1934) ... **N. saleierensis** Kemner
9. *Eyes smaller, long diameter (0.39)-0.41*; head sparsely hairy; eyes not quite round, slightly produced ventrally; ocelli broadly oval; antenna with 18-19 articles, the third one-and-a-half times or twice as long as the fourth, more strongly sclerotized than other articles; head length to tip of labrum (2.12), without mandibles (1.69), width (1.76)-1.90; short diameter of eye (0.32), distance from the lower margin of the head (0.46); ocellus length (0.17), width (0.12), distance from the eye (0.10); pronotum length 1.00-(1.08), width 2.07-(2.08). (Light, 1930) ... **N. microphthalmus** (Light)
- Eyes larger, long diameter more than 0.50 ... 10
10. *Head width (1.69)-1.75*; head broadly oval, reddish brown, sparsely hairy; antennae with 18 articles (16-19 according to Hozawa, 1915), in specimens with 18 articles the second as long as the third, the fourth slightly shorter; head length to tip of labrum (1.94)-2.06, without mandibles (1.58); long diameter of eye (0.54), short diameter (0.46), distance from the lower margin of the head (0.32); ocellus length (0.21), width (0.18), distance from the eye (0.03); pronotum length (0.90)-1.03, width (1.93)-1.98. (Holmgren, 1913) ... **N. koshunensis** (Shiraki)
- Head width 1.90-1.98 ... 11
11. *Difference between pronotum width and head width 0.25*; eyes large, not quite round; ocelli obliquely touching the eyes; antennae with 18-19 articles, the third shorter than the second; head length

to tip of labrum 2.30, width 1.90 ; long diameter of eye 0.70 ; pronotum length 1.15, width 2.15. (Snyder, 1933a)
 **N. gardneri** (Snyder)

*Difference between pronotum width and head*width 0.11* ; head oval, thick, sparsely hairy ; eyes bulging ; ocelli almost touching the eyes ; third antennal article indistinctly shorter than the second, the third and fourth subequal ; pronotum not emarginate posteriorly ; head width 1.98 ; pronotum length 1.14 ; width 2.09. (Holmgren, 1913) **N. artocarp**i (Haviland)

12. *Head width 1.82(1.83)–(1.94)2.02* ; head light castaneous brown, with a few scattered bristles ; eyes almost round, bulging ; ocelli broadly oval, nearly touching the eyes ; antennae with 20 articles, the second slightly longer than the third, the fourth shortest ; pronotum shallowly concave anteriorly, almost straight posteriorly ; head length to tip of labrum (2.34–2.48), without mandibles (1.72–1.80) ; long diameter of eye (0.54–0.61), short diameter (0.54–0.57), distance from the lower margin of the head (0.32–0.36) ; ocellus length (0.21–0.27), width (0.18–0.21), distance from the eye (0.03) ; pronotum length (1.08–1.11), width 1.78(1.08)–(1.98)2.02. (Kalshoven, 1930) **N. dalbergiae** (Kalshoven)

Head width 1.44–1.73 13

13. *Ocelli obliquely touching the eyes* ; head castaneous brown, densely hairy ; third antennal article shorter than the second ; pronotum shallowly concave anteriorly, slightly emarginate posteriorly ; head length to tip of labrum 1.90, width 1.65 ; long diameter of eye 0.50 ; pronotum length 1.00, width 1.70. (Snyder, 1933a)
 **N. andamanensis** (Snyder)

Ocelli close to but not touching the eyes 14

14. Second antennal article one-and-a-half times as long as the third . . . 15
 Second antennal article as long as or indistinctly shorter than the third 16

15. *Head round ; antennae with 17 articles* ; head light yellowish brown, with scattered bristles ; eyes and ocelli almost round ; pronotum shallowly concave anteriorly, sides convex ; head length to tip of labrum 1.87–2.01, without mandibles 1.40–1.51, width 1.54–1.65 ; long diameter of eye 0.39–0.46, short diameter 0.36–0.39, distance from the lower margin of the head 0.32–0.36 ; ocellus length 0.18–0.21, width 0.18, distance from the eye 0.05–0.06 ; pronotum

length 0.79–0.82, width 1.51–1.72. (All measurements by the author)

... .. **N. fletcheri** (Holmgren, K. & N.)

Head oval, antennae with 18 articles, the second as long as the third and fourth combined; head sparsely hairy; radius of forewing extending to half the length of the wing; head width 1.44–1.54; pronotum length 0.68, width 1.48. (Holmgren, 1913)

... .. **N. greeni** (Desneux)

16. *Head width 1.49(1.58)–1.73*; head light reddish brown, sparsely hairy; antennae with 17–20 articles, the second and third subequal, the fourth slightly shorter; pronotum very shallowly concave anteriorly, straight posteriorly; head length to tip of labrum (1.72), without mandibles (1.36), long diameter of eye (0.46), short diameter (0.43), distance from the lower margin of the head (0.25); ocellus length (0.21), width (0.18), distance from the eye (0.03); pronotum length (0.82), width (1.54) 1.58–1.80. (Kalshoven, 1930)

... .. **N. tectonae** (Dammerman)

Head width 1.48; ocelli close to eyes; the third antennal article slightly longer than the second; pronotum length 0.76, width 1.56; length of forewing 11.00. (Holmgren, 1913)

... .. **N. assmuthi** (Holmgren)

Soldiers

1. Small species; head length with mandibles 3.14–3.55, without mandibles 2.11–2.55 2

Large species; head length with mandibles 4.00–6.50, without mandibles 2.50–4.30 3

2. *Pronotum wider than the head*; head light reddish brown, sparsely hairy, slightly narrowed anteriorly; eyes as long as the scape of the antennae; antennae with 16 articles, the third one-and-a-half times as long as the fourth, slightly longer than the second; pronotum broadly and shallowly emarginate anteriorly, almost straight posteriorly, antero-lateral corners narrowly rounded; head length with mandibles 3.14–3.44, without mandibles 2.11–2.25, width 1.41–1.62; postmentum length 1.48–1.66, widest width 0.70–0.78; pronotum length 0.83–1.04, width 1.72–1.81. (Ahmad, 1955a) **N. pishinensis** Ahmad

Pronotum distinctly narrower than the head; head bulging behind, narrowed anteriorly, sides convex; antennae with 12 articles; pronotum broadly concave anteriorly, convex posteriorly, sides

- strongly convex ; head length with mandibles 3.55, without mandibles 2.16, width 1.93 ; pronotum length 0.63, width 1.62. (Light, 1930) **N. parviscutatus** (Light)
3. Third antennal article as long as or shorter than the second ... 4
Third antennal article longer than the second 7
4. *Third antennal article shorter than the second* ; head dark reddish brown, rectangular, sparsely hairy ; antennae with 15-18 articles ; the third as long as or in specimens with 16 articles longer than the fourth ; head length with mandibles 4.75-(5.04), without mandibles (3.09)3.31-(3.67), width 2.17(2.23-2.44) ; eye length (0.21-0.25), width (0.14-0.16) ; postmentum length (2.30-2.66), widest width (0.79), narrowest width (0.28) ; pronotum length (1.08)1.10-(1.15). (Holmgren, 1913) **N. militaris** (Desneux)
Third antennal article as long as the second ... 5
5. *Larger species* ; head length with mandibles 6.00 ; antennae with 16 articles ; pronotum halfmoon-shaped, strongly concave anteriorly ; head length without mandibles 4.24, width 2.77 ; pronotum length 1.25, width 2.62. (Holmgren, 1913) ... **N. artocarp**i (Haviland)
Smaller species ; head length with mandibles 4.50-4.67 ... 6
6. *Difference between head width and pronotum width 0.18* ; head parallel-sided, slightly narrowed anteriorly, yellow behind to reddish brown in front ; antennae with 16 articles, the third obconic, strongly sclerotized, the fourth shortest ; pronotum shallowly and broadly concave anteriorly, straight posteriorly ; head length with (closed) mandibles 4.50, without mandibles 3.33, width 2.34, widest width of postmentum 0.99, narrowest width 0.32 ; pronotum length 1.08, width 2.16. (Light, 1924) **N. sinensis** (Light)
Difference between head width and pronotum width 0.38 ; antennae with 15 articles ; head length with mandibles 4.67, without mandibles 3.15 ; width 2.47 ; pronotum length 1.06, width 2.09. (Holmgren, K. & N., 1917) **N. fletcheri** (Holmgren, K. & N.)
7. Third antennal article one-and-a-half times as long as the second 8
Third antennal article only slightly longer than the second ... 10
8. Head length without mandibles 2.78-3.17 9
Head length without mandibles 3.26(3.74)-(3.78)3.84 ; mandibles very stoutly built, half as long as head capsule, with moderately developed basal hump ; antennae with 13-16 articles ; pronotum

shallowly concave anteriorly, antero-lateral corners broadly rounded; head length with mandibles (5.61–5.83), width 2.21–2.69(2.73–2.80); eye length (0.23–0.25), width (0.14); distance from the antennal foveola (0.18–0.23); postmentum length (2.66–2.88), widest width (0.86–1.00), narrowest width (0.28); pronotum length (1.08–1.15), width 2.11(2.59)–2.64(2.95). (Kalshoven, 1930)

... .. **N. dalbergiae** (Kalshoven)

9. *Head narrower, width 1.87(2.08)–(2.16)2.21*; antennae with 13–15(16) articles, the third strongly sclerotized, obconic, twice as long as the fourth; mandibles with weakly developed basal hump; head length with mandibles (4.60), without mandibles 2.78(2.95)–(3.09)3.17; postmentum length (2.37), widest width (0.72), narrowest width (0.28); pronotum length (1.00–1.08), width 1.97(2.08)–(2.30)2.40. (Kalshoven, 1930) **N. tectonae** (Dammerman)

Head wider, width 2.34–(2.52)2.61; head yellowish brown behind to reddish brown in front, rectangular, thick; antennae with 15 articles, the third strongly sclerotized, obconic, broader than the second, nearly twice as long as the fourth; labrum very small much wider than long; pronotum very weakly concave anteriorly, almost straight posteriorly; head length with mandibles 4.22(4.60)–4.95, without mandibles 2.88–(3.09)3.15; eye length (0.25), width (0.14); postmentum length (2.16), widest width (0.79), narrowest width (0.28); pronotum length (1.08)1.10–1.17, width 2.34–(2.52). (Light, 1930) **N. grandis** (Light)

10. Third antennal article twice as long as the fourth 11
Third antennal article one-and-a-half times as long as the fourth 13

11. Depth of concavity of the anterior margin of pronotum 0.14–0.18;
head length without mandibles 3.16–3.65 12

Depth of concavity of the anterior margin of pronotum 0.07; head length without mandibles (2.88)2.89–3.12; head wider in the anterior half; eye spots prominent; antennae with 15 articles; mandibles with a weak basal hump; pronotum distinctly convex posteriorly; head length with mandibles (4.53)4.60–4.83, width 1.98–2.05(2.23); eye length (0.23), width (0.11); postmentum length (2.02), widest width (0.78); pronotum length 0.93–1.03(1.08), width 2.02–2.20(2.30). (Holmgren, 1913) **N. assmuthi** (Holmgren)

12. *Head narrower in proportion to length (difference between head length and width 1.16–1.35); depth of concavity of the anterior margin of pronotum (0.18)*; head rectangular sparsely hairy; eyes small;

antennae with 14-18 articles, the third strongly sclerotized, obconic, three times as long as the fourth in specimens with 14 articles; mandibles with distinct basal hump; pronotum with a small median notch anteriorly; head length with mandibles (4.89)5.00-(5.11)5.30, without mandibles 3.36(3.38)-(3.52)3.65, width (2.16)2.20-2.30(2.37); eye length (0.16-0.18), width (0.10-0.12); postmentum length (2.23-2.52), widest width (0.75-0.79) pronotum length (1.08)1.13-(1.15)1.16, width (2.23-2.37)2.40-2.54. (Kemner, 1934) **N. sonneratiæ** Kemner

*Head wider in proportion to length (difference between head length and width 0.86-1.03); depth of concavity of the anterior margin of pronotum (0.14); antennae with 15-16 articles, the third strongly sclerotized, obconic; labrum as long as wide, antero-lateral corners broadly rounded; head length with mandibles (4.82-4.89)-4.94, without mandibles (3.16-3.24)-3.42, width (2.30-2.37)-2.39; eye length (0.21), width (0.12); postmentum length (2.16), widest width (0.72), narrowest width (0.21); pronotum length (1.08)-1.14, width (2.37-2.44)-2.51. (Holmgren, 1913)... **N. koshunensis** (Holmgren)*

13. *Head length with mandibles (5.97)-6.50; head parallel-sided, widest anteriorly; eyes broadly rounded, separated from the antennal foveolae by one-and-a-half their short diameter; antennae with 13-(15) articles; pronotum trapezoid, shallowly concave anteriorly; head length without mandibles 4.10(4.24)-4.30, width 2.40-(2.73); eye length (0.36), width (0.21); postmentum length (2.84), widest width (0.88), narrowest width (0.39); pronotum length (1.29)-1.40, width 2.40-(2.80). (Snyder, 1934) ... **N. bosei** (Snyder)*

Head length with mandibles 4.00-5.50 14

14. *Third antennal article not strongly sclerotized, sclerotization as in other articles; eyes oval, wider dorsally; antennae with 15-16(17) articles; mandibles comparatively short; pronotum trapezoid, antero-lateral corners broadly rounded; head length with mandibles 4.70(4.75)-(4.82)4.90, without mandibles (3.09-3.16)3.40-3.50, width (2.30)2.39-(2.59); eye length (0.30), width (0.18); postmentum length (1.98-2.05), widest width (0.72-0.75), narrowest width (0.21); pronotum length (1.00-1.08)-1.14, width 2.28-(2.37-2.44). (Holmgren, 1913) ... **N. greeni** (Desneux)*

Third antennal article modified, darker and more strongly sclerotized than other articles 15

15. *Left mandible with four distinct teeth; head narrower anteriorly, widest in the basal third; antennae with 13-14 articles; pronotum*

only slightly concave anteriorly, slightly emarginate posteriorly ; head length with mandibles 4.00-5.00, without mandibles 2.80-3.08, width 2.05-2.33 ; pronotum length 0.85-1.02, width 2.15-2.30. (Kemner, 1934) ... **N. ketelensis** Kemner

Left mandible with five distinct teeth ... 16

16. *Pronotum only slightly concave anteriorly, antero-lateral corners broadly rounded* ; head cylindrical, sides parallel ; antennae with 13-14 articles ; labrum as wide as long ; third tooth of the left mandible prominent ; head length with mandibles 4.52-4.90, without mandibles 2.88-3.00, head width 2.05-2.19 ; pronotum length 1.00-1.03, width 2.05-2.23. (Kemner, 1934) ... **N. saleierensis** Kemner

Pronotum distinctly concave anteriorly, antero-lateral corners narrowly rounded ; head rectangular, slightly narrowed anteriorly ; eyes very small, indistinct ; antennae with (14) articles, the third strongly sclerotized, obconic ; head length with mandibles 4.00-5.50, without mandibles 2.50-3.70(3.74), width 1.80-2.50(2.59) ; postmentum length (2.52), widest width (1.08) ; pronotum length 0.70-1.25(1.44), width 1.80-2.50(2.52). (Light, 1930) ... **N. malatensis** Oshima

Genus *GLYPTOTERMES* Froggatt

KEY TO THE SPECIES

Imagoes

- | | | | | | |
|----------------------------|-----|-----|-----|-----|---|
| 1. Width of head 1.35-1.52 | ... | ... | ... | ... | 2 |
| Width of head up to 1.29 | ... | ... | ... | ... | 4 |
2. *Pronotum wider than the head* ; head oval ; antennae with 14-17 articles, the second distinctly longer than the third, the latter shortest ; ocelli close to but not touching the eyes ; pronotum halfmoon-shaped, antero-lateral corners broadly rounded ; subcosta and radius of forewing short ; body length with wings 11.00-12.50, without wings 6.00-7.00 ; head length without mandibles 1.53-1.56, width 1.35-1.41 ; pronotum length 0.70-0.80, width 1.47-1.53. (Hozawa, 1915) ... **G. satsumensis** (Matsumura)
- Pronotum narrower than the head ... 3
3. *Antennae with 11 articles* ; head dark castaneous brown ; body length with wings 11.50-12.00 ; length of forewing 9.50 ; head width 1.44, pronotum width 1.37. (Holmgren, 1914) ...
- ... **G. buttel-reepeni** (Holmgren)
- Antennae with 14-17 articles* ; the second longer than the third ; eyes round, bulging ; ocelli close to but not touching the eyes ; pronotum

rectangular, with a median notch anteriorly, straight posteriorly ; body length with wings 12.50–13.00, without wings 5.30–8.30 ; length of forewing 11.00 ; head width 1.38–1.45 ; pronotum length 0.70–0.77, width 1.23–1.31. (Kemner, 1934) ...

... .. **G. montanus** Kemner

4. Head oval 5
Head parallel-sided 6

5. *Head width 0.74(0.75)–0.78 ; pronotum width (0.57)0.66–0.70*, head dark brown, very sparsely hairy ; ocelli and eyes broadly oval ; antennae short, with 11–12 articles ; the third one-and-a-half times as long as the second in specimens with 11 articles, in specimens with 12 articles the third as long as or slightly shorter than the second, the third more strongly sclerotized than other articles ; head length to tip of labrum (0.88), without mandibles (0.75) ; long diameter of eye (0.20), short diameter (0.15), distance from the lower margin of the head (0.15) ; ocellus length (0.06), width (0.05), distance from the eye (0.02) ; pronotum length (0.41)–0.42. (Kemner, 1934) **G. caudomunitus** Kemner

Head width 0.85 ; pronotum width 0.76 ; head dark brown ; eyes oval ; ocelli round, almost touching the eyes ; the second and third antennal articles subequal, the fourth distinctly longer and much thicker than the third ; head length to tip of labrum 0.99 ; pronotum length 0.49. (Kemner, 1932) **G. minutus** Kemner

6. Head width 1.18–1.29 7
Head width less than 1.18 8

7. *Ocelli touching the eyes ; antennae with 13 articles* ; head considerably arched ; third antennal article as long as the second ; pronotum with a yellowish T-shaped marking, antero-lateral corners angularly rounded ; subcosta of forewing rudimentary, radius short ; body length with wings 8.50, without wings 4.70–6.00 ; length of forewing 7.30 ; head length to tip of labrum 1.37–1.52, width 1.18–1.29 ; pronotum length 0.53–0.72, width 0.99–1.22. (Holmgren, 1913) **G. ceylonicus** (Holmgren)

Ocelli close to but not touching the eyes ; antennae with 11–12 articles, the third shorter than the second, as long as the fourth ; pronotum halfmoon-shaped ; subcosta and radius of forewing rudimentary ; body length with wings 9.50–10.00, without wings 7.00–8.00 ; length of forewing 7.00 ; head length to tip of labrum 1.63, width 1.22 ; pronotum length 0.72, width 1.29. (Holmgren, 1913)

... .. **G. borneensis** (Haviland)

8. Second antennal article as long as the third and fourth combined ... 9
 Second antennal article shorter 10
9. *Pronotum with antero-lateral corners broadly rounded; labrum wider than long; length of forewing 6.60; eyes oval; ocelli very close to eyes; antennae with 12 articles, the second a little longer than the third and fourth combined; pronotum widely and shallowly concave anteriorly, nearly straight posteriorly; body length with wings 7.60, without wings 4.80; head length to tip of labrum 0.91, width 0.90. (Gardner, 1944) ... **G. almorensis** (Gardner)*
Pronotum with very narrowly rounded antero-lateral corners; labrum as wide as long; length of forewing 5.00; head slightly longer than wide, light brown to dark, with a few short scattered hairs; eyes broadly oval, ocular suture very prominent; ocelli not very distinct; antennae with 12 articles, the second as long as the third and fourth combined; head length to tip of labrum (0.96–0.98)–1.09, without mandibles (0.78–0.81), width (0.78–0.84)–0.90; long diameter of eye (0.20–0.23), width (0.15–0.18)–0.19, distance from the lower margin of the head (0.14–0.18); ocellus length (0.08)–0.09, width 0.057–(0.065), distance from the eye (0.026); pronotum length (0.46)–0.47, width (0.75–0.78)–0.88. (Light, 1930)
 **G. chapmani** Light*
10. *Head and abdominal tergites almost black; wings brown; head with a few scattered hairs; eyes almost round, bulging; ocelli very small; antennae with 11–12 articles, the third one-and-a-half times or only slightly longer than the second; pronotum shallowly concave anteriorly, convex laterally and posteriorly; radius of the forewing nearly one-fourth the length of the wing; head length to tip of labrum (1.06), without mandibles (0.91), width 0.85–0.92(0.96); long diameter of eye (0.23), short diameter (0.20), distance from the lower margin of the head (0.20); ocellus length (0.09), width (0.07), distance from the eye (0.03); pronotum length 0.46–0.49 (0.53), width 0.77–0.81(0.91). (Kemner, 1934)*
 **G. niger** Kemner

*The imago of *Glyptotermes dentatus* (Haviland) could not be placed in this key because of its original description being inadequate. Light (1930) regards it close to *G. chapmani* from which, according to him, it differs by having antennae with 12 articles, smaller wings, ocelli touching the eyes and sternum of the 7th abdominal segment in the female nearly as wide as long. Haviland's description of *G. dentatus* as reproduced in Holmgren's Monograph (1913) is as follows: "Female 4.5 mm. long. Ocellus in contact with the eye. Antennae with 11 segments. Pronotum reniform, Wing 4.3 mm. long, 1.1 mm. broad; costal area narrowed, not nerved, the median contiguous to the subcostal throughout its length. Legs not reaching to the end of the abdomen. Ventral plate of the 7th abdominal segment nearly as broad as long."

Head and abdominal tergites reddish brown ... 11

11. *Eyes larger, long diameter (0.33), short diameter (0.31)*; head light reddish brown; eyes almost round; ocelli broadly oval; antennae with 14-15 articles, the second as long as the third; pronotum half-moon-shaped; antero-lateral corners broadly rounded, posterior margin moderately convex; head length to tip of labrum 1.48- (1.50), without mandibles (1.04-1.06), width (1.09)-1.29; distance between eye and the lower margin of the head (0.20-0.23); ocellus length (0.14-0.15), width (0.10-0.11), distance from the eye (0.026); pronotum length 0.61-(0.62), width (1.04-1.06)-1.10. (Holmgren, 1913) ... **G. dilatatus** (Bug. and Popoff)

Eyes smaller, long diameter 0.23-0.26, short diameter 0.20 ... 12

12. *Pronotum as wide as or slightly wider than the head, trapezoid*; head reddish brown; very sparsely hairy; eyes broadly oval; ocelli almost round; antennae with 12-13 articles, in specimens with 12 articles the second slightly shorter than the third, the third and fourth subequal; head length to tip of labrum (1.19), without mandibles (0.96) 1.00-1.13, width 0.87(0.96)-1.10; long diameter of eye (0.23), short diameter (0.20); distance from the lower margin of the head (0.20); ocellus length (0.09), width (0.07), distance from the eye (0.039); pronotum length 0.40-(0.53), width 0.87(0.91)-1.03, depth of anterior concavity (0.03). (Hozawa, 1915) ... **G. fuscus** Oshima

Pronotum narrower than the head, half-moon-shaped; head reddish brown, sparsely hairy; eyes and ocelli broadly oval; antennae with 13-(14) articles, the second longer than the third, the latter shortest; head length to tip of labrum (1.22)-1.29, without mandibles (0.98), width (1.01)-1.03-(1.04); long diameter of eye (0.26), short diameter (0.20), distance from the lower margin of the head (0.16-0.18); ocellus length (0.10), width (0.07), distance from the eye (0.02); pronotum length (0.52) 0.53-(0.54), width 0.91. (Holmgren, 1913) ... **G. brevicaudatus** (Haviland)*

Soldiers

1. *Frons of head perpendicularly sloping, prominently bilobed*; head dark brown, darker anteriorly; antennae with 10-11 articles, the

*The imago of *Glyptotermes pinangae* (Hav.) has not been included in the key because of its poor description. The original description is: "Female 5 mm. long, slender, castaneous. Ocelli in contact with the eyes. Pronotum slightly narrower than the head. Tarsi pale. Hind legs reaching to the 4th abdominal segment" (Holmgren, 1913).

third shortest ; labrum longer than wide, covering three-fourths of the mandibles ; pronotum parallel-sided, antero-lateral and postero-lateral corners prominent, shallowly concave anteriorly, slightly emarginate posteriorly ; head length with mandibles (1.48)–1.56, without mandibles (1.06)–1.25, width (0.85)–0.95 ; pronotum length (0.44)–0.46, width (0.80)–0.99. (Holmgren, 1913) ...

... **G. pinangae** (Haviland)

Frons sloping but not perpendicularly, lateral lobes distinct but not very prominent ... 2

2. Head length without mandibles 2.01–3.54 ... 3

Head length without mandibles 1.09–1.77 ... 7

3. *Head length without mandibles 3.10–3.54* ; head nearly twice as long as wide, parallel-sided, posterior margin almost straight ; eyes oval ; antennae with 15 articles* ; pronotum subreniform, broadly and shallowly concave in front, convex behind, with a median slight emargination ; head length with mandibles 3.90–4.40, width 1.60–1.80 ; pronotum length 0.80, width 1.90. (Hozawa, 1915) ...

... **G. satsumensis** (Matsumura)

Head length without mandibles not exceeding 3.10 ... 4

4. Labrum long, extending beyond half the length of the mandibles ... 5

Labrum short, not extending beyond half the length of the mandibles ... 6

5. *Head length without mandibles 2.32–2.47* ; antennae with 11 articles, rarely with 12 articles ; pronotum halfmoon-shaped ; head length with mandibles 3.08–3.27, width 1.48–1.63 ; pronotum length 0.68–0.76, width 1.52–1.63. (Holmgren, 1913) ...

... **G. borneensis** (Haviland)

Head length without mandibles 2.62–(3.01) ; antennae with 12–(13) articles, the third longer than the second in specimens with 12 articles, and shorter in specimens with 13 articles ; pronotum halfmoon-shaped, hind margin slightly emarginate ; head length with mandibles 3.31–(3.84), width 1.56–(1.66) ; length of eye spot (0.20), width (0.15) ; postmentum length (1.82), widest width (0.46), narrowest width (0.18) ; pronotum length 0.65–(0.83), width 1.33–(1.66). (Holmgren, 1913) ... **G. ceylonicus** (Holmgren)

6. *Head length without mandibles 2.10(2.02)–2.13* ; antennae with 12–(13) articles, the second as long as or twice as long as the third ;

*13 articles according to Holmgren (1913).

labrum reaching the basal third of the mandibles ; mandibles with inconspicuous basal hump, long and slender ; head length with mandibles 2.85(3.01)–3.08(3.12), width 1.29–1.33(1.40–1.50); postmentum length (1.50), widest width (0.45), narrowest width (0.17) ; pronotum length (0.57)–(0.62)0.65, width 1.10–1.29(1.30–1.45), depth of anterior concavity (0.10). (Holmgren, 1913) ...

... **G. dilatatus** (Bugnion and Popoff)

Head length without mandibles 2.23 (2.44)–(2.60)2.80; head cylindrical, thick ; antennae with 12–14 articles, the second nearly as long as or slightly shorter than the third ; labrum extending up to slightly less than half the length of the mandibles ; head length with mandibles 3.00(3.43)–(3.64)3.85, width 1.41(1.56)–1.68(1.71) ; postmentum length (1.61), widest width (0.41), narrowest width (0.26) ; pronotum length (0.66–0.75), width 1.20–(1.50)1.53. (Kemner, 1934) ... **G. montanus** Kemner

7. Tenth abdominal tergite much more strongly sclerotized than other tergites ... 8

Tenth abdominal tergite not much more strongly sclerotized than other tergites ... 9

8. *Labrum much longer than wide, slightly narrowed anteriorly* ; antennae with 9–10 articles ; mandibles short, thick, with strongly curved tips ; pronotum broadly emarginate anteriorly, sides slightly convex, posterior margin broadly convex ; head length with mandibles 1.65–1.94, without mandibles 1.16–1.38, width 0.74–0.92 ; pronotum length 0.42–0.44, width 0.70–0.81. (Kemner, 1932) ...

... **G. minutus** Kemner

Labrum slightly wider than long, broadly rounded anteriorly ; frons gradually sloping, frontal lobes not prominent, lateral sides of head moderately convex, converging anteriorly ; antennae with 9–10 articles, the second as long as or longer than the third ; mandibles with weakly developed basal hump ; pronotum rectangular, rather deeply concave anteriorly, shallowly concave posteriorly ; head length with mandibles 1.50(1.52)–1.55(1.56), without mandibles (1.09–1.11)1.16–1.27, width (0.79–0.83)0.85–0.88 ; postmentum length (0.75), widest width (0.28–0.29), narrowest width (0.13) ; pronotum length (0.36–0.39), width (0.72)0.74–0.85. (Kemner, 1934) ...

... **G. caudomunitus** Kemner

9. Mandibles long, about half or slightly less than half the length of the head capsule ... 10
Mandibles shorter, less than one-third the length of the head capsule ... 12

10. Postmentum twice as wide anteriorly as posteriorly12
Postmentum less than twice as wide anteriorly as posteriorly; head parallel-sided; eye spots pale, small, broadly oval, separated from the antennal foveolae by their width; antennae with 11-12 articles; outer margin of mandibles straight, abruptly incurved apically; pronotum with anterior margin weakly concave, posterior margin nearly straight; head length without mandibles 1.46-1.68, width 1.06-1.12; mandible length 0.80. (Gardner, 1944)
 **G. almorensis** (Gardner)
11. *Mandibles light reddish brown, slender, thin, with prominent basal hump; eye spots very indistinct*; antennae with 10-(11) articles, the second longer than the third; pronotum trapezoid, antero-lateral corners narrowly rounded, posterior margin moderately convex, with a shallow median concavity; head length with mandibles 1.94-2.05(2.23-2.34), without mandibles 1.29-1.37(1.61-1.66), width 0.99-1.10(1.14); postmentum length (1.06-1.09), widest width (0.36-0.39); pronotum length 0.46-(0.52), width 0.95(0.98)-1.04 (1.06). (Holmgren, K. & N., 1917)
 **G. coorgensis** (Holmgren, K. & N.)
- Mandibles dark brown, almost black, very stoutly built, basal hump weakly developed; eye spots distinct*, separated from the antennal foveolae by one-and-a-half their diameter; antennae with 11 articles, the second one-and-a-half times as long as the third, latter shortest; head length with mandibles (1.87-1.89) 2.00-2.15, without mandibles (1.35-1.37) 1.40-1.50, width 0.90(0.96)-(1.10) 1.03; widest width of postmentum 0.27-(0.28), narrowest width 0.13; pronotum length (0.41-0.44)-0.50, width (0.80-0.85). (Light, 1930)
 **G. chapmani** Light
12. *Small species, head length with mandibles 1.67, without mandibles 1.29*; antennae with 10-11 articles, the third smallest; eyes rudimentary; labrum as long as wide; pronotum with anterior margin broadly concave, slightly emarginate in the middle, posterior margin with a slight median emargination; head width 0.91; pronotum length 0.46, width 0.91. (Holmgren, 1913) **G. fuscus** Oshima
- Large species; head length with mandibles 2.08-2.33, without mandibles 1.61-1.67 13
13. *Mandibles one-fourth as long as the head capsule*; antennae with 10-11 articles; labrum extending beyond half the length of the mandibles; right mandible with two closely placed marginal teeth, left mandible also with two marginal teeth but the latter separated by a wide, deeply curved margin; pronotum shallowly concave

anteriorly, posterior margin slightly incised medially; head length with mandibles 2.09, without mandibles 1.67, width 0.91; pronotum length 0.48, width 0.84. (Holmgren, 1913)

G. dentatus (Haviland)

Mandibles more than one-fourth as long as the head capsu'e; head cylindrical, antennae with 10-12 articles, in specimens with 10 articles the second indistinctly shorter than the third, the fourth shorter but thicker than the third; pronotum deeply but broadly notched anteriorly, slightly emarginate posteriorly, antero-lateral corners prominent; head length with mandibles (2.08)2.15-2.33, without mandibles (1.61)1.62-(1.66)1.77, width (0.96)0.98-(1.04)1.06, pronotum length (0.46)0.49-0.60, width 0.92(0.93)-(0.98)1.02 (Kemner, 1934) **G. niger** Kemner

Genus *CRYPTOTERMES* Banks

KEY TO THE SPECIES

Imagoes

- | | | | | | | |
|----|----------------------|-----|-----|-----|-----|---|
| 1. | Head width 0.79-0.83 | ... | ... | ... | ... | 2 |
| | Head width 0.95-1.09 | ... | ... | ... | ... | 3 |
2. *Head parallel-sided*, flat, reddish brown; eyes and ocelli broadly oval; ocelli touching the eyes; antennae with 13-15 articles, the second as long as or longer than the third, the fourth as long as or shorter than the third; pronotum shallowly concave anteriorly, sides moderately convex, posterior margin almost straight with an indistinct emargination; radius sector and median of forewing joining at the base, radius sector with five branches, median joining radius sector at the origin of the third branch of the latter; body length without wings 4.75; head length to tip of labrum (0.93-0.96)-1.00; without mandibles (0.78), width (0.78)-0.80(0.83); long diameter of eye (0.23-0.24), short diameter (0.18-0.20), distance from the lower margin of the head (0.130-0.137); ocellus length (0.13), width (0.078-0.090); pronotum length 0.45(0.46)-0.48, width (0.70-0.72)-0.75. (Light, 1921) ... **C. cynocephalus** Light
- Head oval*, ocelli triangular, touching the eyes; antennae with 13-14 articles, pronotum with a median notch anteriorly; radius sector of forewing with 4-6 branches; body length without wings 4.50-4.90; head length to tip of labrum 1.00-1.06, width 0.79-0.81; pronotum length 0.46-0.49, width 0.70-0.72. (Kemner, 1932) **C. perforans** Kemner
- | | | | |
|----|--|-----|---|
| 3. | Pronotum distinctly and angularly notched anteriorly | ... | 4 |
| | Pronotum shallowly concave anteriorly, not notched | ... | 5 |

4. *Eyes comparatively large, long diameter 0.35* ; head oval, much longer than wide ; eyes slightly triangular ; ocelli small, touching the eyes ; antennae with 15 articles ; radius sector of forewing with 7 branches, median joining radius sector between branches 3 and 4 or between 4 and 5, cubitus with 14 branches ; body length without wings 5.30-6.00 ; forewings with scales 9.20-9.60 long ; head length to tip of labrum 1.38, width 1.07-1.09 ; pronotum length 0.63, width 0.99-1.02. (Kemner, 1930) ... **C. sumatrensis** Kemner

Eyes comparatively small, long diameter 0.27-0.31, average 0.29 ; head oval ; ocelli suboval, touching the eyes ; antennae with 14-17 articles ; radius sector of forewing with 5-7 branches, median joining radius sector between branches 3 and 4, cubitus with 12-14 branches ; body length without wings 4.98-6.04 ; length of forewing 6.80-7.70 ; head length to tip of labrum 1.17-1.33, width 0.96-1.02 ; pronotum length 0.54-0.60, width 0.87-1.04. (Coaton, 1950) ...
 **C. havilandi** (Sjostedt)*

5. *Eyes, comparatively large, long diameter (0.31), short diameter (0.25-0.26)* ; head light brown, very sparsely hairy ; antennae with 15-16 articles, the third slightly longer than the second ; lateral sides of pronotum moderately convex, posterior margin almost straight, with an indistinct median emargination ; head length to tip of labrum (1.22-1.24), without mandibles (1.04-1.06), width (1.00) 1.02-(1.06)1.09 ; distance between eye and the lower margin of the head (0.23) ; ocellus length (0.130-0.135), width (0.10-0.11), distance from the eye (0.026) ; pronotum length 0.60(0.62)-0.63 (0.65), width (0.96) 0.99-(1.01)1.02. (Kemner 1932) ...
 **C. dudleyi** Banks†

Eyes comparatively small, long diameter (0.23-0.28), short diameter (0.13-0.23) ; eyes not quite round, anterior margin rather straight ; ocelli almost touching the ocular suture : antennae with 14-17 articles, the second, third and fourth nearly subequal ; pronotum trapezoid, slightly concave anteriorly ; head length to tip of labrum 1.07 (1.11)-1.13 (1.24), without mandibles (0.91-0.93), width (0.88-0.91)0.95-1.00 ; distance between eye and the lower margin of the head (0.18-0.20) ; ocellus length (0.104-0.109), width (0.072-0.078), distance from the eye (0.02) ; pronotum length (0.54) 0.57-0.63, width (0.83-0.88)1.20-1.25. (Hozawa, 1915) ...
 **C. domesticus** (Häviland)

**Cryptotermes bengalensis* Snyder listed in Snyder's catalogue (1949) is not a valid species. It is synonymous with *C. havilandi*. See Ahmad (1951).

†Described as "*Planocryptotermes primus*" from Ceylon

Soldiers

1. *One tubercle at the base of the antenna*; head subquadrate, black anteriorly, lighter posteriorly; eyes whitish, oval; antennae with 11-14 articles, in specimens with 12 articles the second slightly longer than the third, the fourth shortest; labrum pentagonal, wider than long; mandibles short, broad, thin, with reduced dentition, tips sharply pointed; pronotum broadly emarginate anteriorly, sides curved, antero-lateral corners sharply pointed, posterior margin almost straight; head length with mandibles (1.76)1.77-1.80, without mandibles (1.45)1.47-1.57, width 1.27-1.30(1.32); eye length (0.13), width (0.07), distance from the antennal foveola (0.15); pronotum length 0.60(0.67)-0.70, width 1.10 (1.22)-1.30. (Hozawa, 1915)... .. **C. domesticus** (Haviland)

Two tubercles at the base of the antenna 2

2. *Head length with mandibles (2.08-2.28) 2.30-2.45*; head black anteriorly, cylindrical; antennae with 11-12 (14) articles, in specimens with 14 articles the second more than twice as long as the third, the latter shortest, in specimens with 13 articles the second as long as the third, the fourth shortest; labrum rounded anteriorly, wider than long; mandibles long, slender with distinct dentition, left mandible with three and right with two marginal teeth; pronotum deeply notched anteriorly, broad V-shaped, sides rounded; head length without mandibles 1.60(1.61)-1.67(1.71), width (1.19)1.31-1.41(1.43); eye length (0.10), width (0.06); postmentum length (0.57), width (0.31); pronotum length (0.62-0.65), width (1.06) 1.09-1.23 (1.35). (Kemner, 1934) **C. dudleyi** Banks

Head length with mandibles up to 1.96 3

3. Head length with mandibles 1.58-1.96 4
Head length with mandibles up to 1.34 5

4. *Posterior margin of pronotum straight, lateral sides almost parallel*; antennae with 11-12 articles, the second strongly sclerotized; head length with mandibles 1.62-1.66, without mandibles 1.23-1.31, width 1.06-1.13; pronotum width 0.95-1.02. (Kemner, 1930).
... .. **C. sumatrensis** Kemner

Posterior margin of pronotum convex, lateral sides curved, converging in front; antennae with 11-14 articles; labrum tongue shaped;

mandibles with prominent angular hump at the base ; head length with mandibles 1.58-1.96, without mandibles 1.33-1.66, width 1.08-1.35 ; pronotum length 0.62-0.79, width 1.04-1.42. (Coaton, 1950)

... .. **C. havilandi** (Sjostedt)

3. *Anterior surface of the head deeply concave, very rough*, deeply punctate; antennae with 9-12 articles, the third small, the second strongly sclerotized ; mandibles short, without or with inconspicuous teeth ; pronotum deeply notched anteriorly, antero-lateral lobes rounded ; head length with mandibles 1.20-1.23, without mandibles (0.83)0.88-0.92, width (0.83)0.95-0.98 ; pronotum length (0.52), width (0.78)0.85-0.88. (Kemner, 1934)... .. **C. cynocephalus** Light *

Anterior surface of the head not very deeply concave, not very rough; mandibles comparatively short, without teeth; antennae with 10-11 articles, head length with mandibles 1.23-1.34, without mandibles 1.02-1.09, width 0.88-0.96 ; pronotum width 0.88-0.92. (Kemner, 1932) **C. perforans** Kemner

FAMILY HODOTERMITIDAE

KEY TO THE GENERA

Imagoes

1. Left mandible with three well-developed marginal teeth, right mandible with a conspicuous subsidiary tooth at the base of the anterior cutting edge of the first marginal tooth ; eyes large, reniform ; tarsi with 5 articles **Archotermopsis**

Left mandible with only two marginal teeth ; right mandible with an inconspicuous subsidiary tooth ; eyes small, not reniform; tarsi with 4 articles **Anacanthotermes**

Soldiers

1. Tarsi with 4 articles ; pronotum saddle-shaped; tibiae without lateral spines **Anacanthotermes**
Tarsi with 5 articles 2
2. Head with curved lateral and posterior sides ; mandibles comparatively short, very stout, strongly curved ; only hind tibiae with lateral spines **Hodotermopsis**

*Described as "*Cryptotermes buitenzorgi*".

Head rectangular, trilobed posteriorly; mandibles comparatively long; all tibiae with lateral spines ... **Archotermopsis** (Desneux)

Genus *ARCHOTERMOPSIS* (Desneux)

Single species: **Archotermopsis wroughtoni** (Desneux)

IMAGO: Head reddish brown, sparsely hairy, almost round, slightly produced behind in the middle; antennae with 23-27 articles, the second one-and-a-half times as long as the third; pronotum halfmoon-shaped, indistinctly emarginate anteriorly, almost straight posteriorly; head length to tip of labrum 2.63-2.96, without mandibles 1.96-2.40, width 2.33-2.70; eye length 0.85-1.04, width 0.69-0.77, distance from the lower margin of the head 0.18-0.22; pronotum length 0.96-1.22, width 1.89-2.22. (Ahmad, 1955a).

SOLDIER: Head light reddish brown, with a few minute hairs; eyes spindle-shaped, slightly shorter than the scape of the antenna; antennae with 23-26 articles, the second slightly longer than the third; pronotum flat; head length with mandibles 6.33-7.00, without mandibles 3.85-4.06, width 3.57-3.85; postmentum length 2.52-2.94, width of postmentum 1.05-1.12; pronotum length 1.47-1.54, width 2.38-2.66. (Ahmad, 1955a).

Genus *HODOTERMOPSIS* Holmgren

KEY TO THE SPECIES

Soldiers

1. *First marginal tooth of the right mandible with a sharp triangular process at the base of the anterior cutting edge, recalling the subsidiary tooth of the imago-worker mandible*; head oval, slightly longer than wide; eyes rudimentary, oval; pronotum halfmoon-shaped, shallowly concave anteriorly, emarginate posteriorly; head length with mandibles 6.74-7.22, without mandibles 4.18-4.60, width 3.80-4.18; pronotum length 1.18-1.33, width 2.85-3.04. (Holmgren, 1913) **H. japonicus** Holmgren

First marginal tooth of the right mandible with a blunt process; head length with mandibles 7.20-7.30, without mandibles 4.50-4.70, width 4.18-4.38, pronotum length 1.48-1.56, width 3.23-3.42. (Holmgren, 1913) **H. sjostedti** Holmgren

Genus *ANACANTHOTERMES* Jacobson

KEY TO THE SPECIES

Imagoes

1. *Pronotum* width 2.85; head width 3.42; antennae with 29–30 articles; body length without wings 14.00; pronotum length 1.71. (Holmgren, K. & N., 1917) ... **A. viarum** (Koenig)
- Pronotum* width 2.22–2.41; head width 2.96–3.18, head brownish yellow, with long bristles, more numerous on lateral sides; antennae with 26–29 articles, the second as long as the third and fourth combined; pronotum raised anteriorly, indistinctly emarginate anteriorly, without emargination posteriorly; head length to tip of labrum 3.44–3.70, without mandibles 2.41–2.66, long diameter of eye 0.48–0.52, short diameter 0.32–0.37, distance from the lower margin of the head 0.55–0.62; pronotum length 1.41–1.55. (Ahmad, 1955a) ... **A. macrocephalus** (Desneux)

Soldiers

1. *Pronotum* trapeziform, posterior margin straight, width 3.60; head length with mandibles 8.00, without mandibles 5.30, width 4.63; antennae with 30 articles. (Holmgren, K. & N., 1917). ...
... .. **A. viarum** (Koenig)
- Pronotum* halfmoon-shaped, posterior margin convex, width 1.82–3.25; head length with mandibles 4.60–7.22; without mandibles 3.01–4.56, width 2.94–4.56, pronotum length 0.98–1.80, antennae with 29 articles, the second longer than the third, the third and fourth subequal. (Ahmad, 1955a) ... **A. macrocephalus** (Desneux)

Family RHINOTERMITIDAE

KEY TO THE GENERA

Imagoes

1. Second marginal tooth of the left mandible distinctly longer than the first 2
Second marginal tooth of the left mandible nearly as long as or shorter than the first 5
2. Head parallell-sided; 3: 2: 2 tibial spur arrangement; forewing scales and pronotum comparatively reduced.
... .. **Heterotermes**

- Head not parallel-sided 3
3. Clypeus considerably enlarged, without a distinct median groove;
head broadly egg-shaped; wing membrane strongly reticulate,
median arising from cubitus or not greatly separated from it ...
... .. **Prorhinotermes**
Clypeus not greatly enlarged, short 4
4. Head round; pronotum broad, only slightly narrower than the
head; 3: 3: 3 tibial spur arrangement; wing veins well-
developed; forewing scales considerably longer than hindwing
scales, overlapping the latter **Coptotermes**
Head triangularly oval; pronotum considerably shorter; 2: 2: 2
tibial spur arrangement; wing membrane slightly reticulate,
venation reduced, radius and median either absent or faintly
present **Termitogeton**
5. Second marginal tooth of the left mandible as long as the first
marginal tooth; anterior wing scales not overlapping the hindwing
scales **Reticulitermes**
Second marginal tooth distinctly smaller than the first ... 6
6. Clypeus short; head round; forewing scales large; wing membrane
strongly reticulate, median approximated to cubitus
... .. **Stylotermes**
Clypeus considerably enlarged, anteriorly produced, with a median
groove 7
7. Antennae with 20 articles **Schedorhinotermes**
Antennae with 16-17 articles **Parrhinotermes**

Soldiers

1. Head parallel-sided 2
Head narrowed anteriorly 4
2. Labrum short, semicircular, tip not hyaline; mandibles very short,
stoutly built; pronotum almost halfmoon-shaped
... .. **Stylotermes**
Labrum elongate, tip hyaline; mandibles slender ... 3
3. Labrum tongue-shaped, sometimes slightly pointed, tip slightly
hyaline **Reticulitermes**
Labrum with needle-shaped hyaline tip **Heterotermes**

4. Fontanelle opening far in front, with a short tubular elongation
 **Coptotermes**
 Fontanelle in normal position, without tubular elongation ... 5
5. Mandibles without distinct teeth 6
 Mandibles with distinct teeth 7
6. Head concave posteriorly, considerably broad behind, almost
 triangular in shape; pronotum with a median slightly produced
 process; eyes absent **Termitogeton**
 Head convex behind, elongately oval, with a groove running
 forward from the fontanelle; pronotum without median process;
 eyes present **Prorhinotermes**
7. Mandibles very finely serrated or toothed at the base; monomor-
 phic **Parrhinotermes**
 Mandibles without serration or teeth at base; dimorphic, minor
 soldier differing greatly in form and size from the major soldier
 **Schedorhinotermes**

Genus *COPTOTERMES* Wasmann

KEY TO THE SPECIES

Imagoes

1. Eyes larger, long diameter 0.44-0.46 2
 Eyes smaller, long diameter less than 0.40 3
2. *Ocelli very close to eyes, separated by a distance nearly one-fifth their long diameter; head length without mandibles (1.19-1.24); eyes round; ocelli broadly oval; antennae with 22 articles, the second one-and-a-half times as long as the third, the fourth shortest; antero-lateral corners of pronotum broadly rounded; head length to tip of labrum (1.61-1.66)-1.82, width (1.63-1.69)1.71-1.75; long diameter of eye (0.46), short diameter (0.44-0.46), distance from the lower margin of the head (0.18-0.20); ocellus length (0.16-0.20), width (0.13-0.15), distance from the eye (0.30-0.40); pronotum length (0.91-0.93)-0.95, width 1.52(1.53)-(1.59)1.63, depth of anterior concavity (0.13). (Holmgren, 1913) **C. curvignathus** Holmgren*
Ocelli farther from the eyes, separated by slightly less than half their long diameter; head length without mandibles 1.34-1.37; head round; eyes almost round; ocelli broadly oval; antennae with 23 articles,

the second slightly longer than the third, the fourth slightly longer than the third; pronotum halfmoon-shaped, antero-lateral angles broadly rounded, posterior margin weakly emarginate in the middle; head length to tip of labrum (1.82), width 1.41-1.50 (1.71); long diameter of eye (0.44), short diameter (0.41), distance from the lower margin of the head (0.18); ocellus length (0.18), width (0.13), distance from the eye (0.07); pronotum length (0.91) 0.94-1.03, width 1.53(1.58)-1.66. (Oshima, 1914, in Kemner, 1934)

... ..

C. menadoensis Oshima

3. *Head length without mandibles* (1.24-1.27); head brownish red, much darker than pronotum; eyes round; ocelli broadly oval; antennae with (19)-21* articles, in specimens with 19 articles the second one-and-a-half times as long as the third, the fourth slightly shorter than the third; pronotum large, shallowly concave anteriorly, indistinctly emarginate posteriorly, sides broadly convex; head length to tip of labrum (1.56)1.63-1.79, width (1.45-1.58)1.60-1.71; long diameter of eye (0.36-0.39), short diameter (0.33-0.36), distance from the lower margin of the head (0.15-0.16); ocellus length (0.16-0.19), width (0.13-0.14), distance from the eye (0.05-0.07); pronotum length (0.80)-0.87, width (1.27-1.36)-1.52. (Holmgren, 1913)

C. formosanus Shiraki

Head length without mandibles 1.01-1.20

... .. 4

4. *Antennal articles spherical from the 8th onwards*; head castaneous brown; antennae with (20)-22 articles, in specimens with 20 articles the second nearly twice as long as the third, the latter shortest; head length to tip of labrum (1.53)1.60-1.63, width (1.35)1.41-1.44(1.48); long diameter of eye (0.31-0.36), short diameter (0.28-0.33), distance from the lower margin of the head (0.15); ocellus length (0.14-0.15), width (0.11-0.13); distance from the eye (0.026-0.030); pronotum length (0.75)-0.76, width (1.30)-1.33 (1.40). (Holmgren, 1913)

... **C. havilandi** Holmgren

Antennal articles spherical from the 9th onwards

... .. 5

Antennal articles spherical from the 11th onwards

... .. 6

5. *Head width* (1.27-1.32)-1.35; head dark brown, broadly oval; eyes not strongly bulging; ocelli oval; antennae with 20-22 articles, the third shortest; labrum tongue-shaped, slightly wider than long; postclypeus one-fourth as long as wide; pronotum shallowly

*According to Hozawa (1915).

concave anteriorly, with an indistinct median notch, slightly but distinctly notched posteriorly; head length to tip of labrum 1.48, without mandibles 0.95-(1.01-1.04), long diameter of eye (0.33), short diameter (0.31), distance from the lower margin of the head (0.15); ocellus length (0.15)-0.17, width 0.07-(0.11-0.13), distance from the eye (0.02); pronotum length (0.65)-0.85, width (1.09) 1.13-1.20. (Light, 1929) ... **C. vastator** Light

Head width (1.37) 1.44-1.53; head broadly oval; eyes almost round; ocelli broadly oval; second antennal article slightly longer than the third, the latter shortest; postclypeus more than three times as wide as long; pronotum with long posteriorly directed bristles, less distinctly concave anteriorly and less distinctly emarginate posteriorly than in *C. vastator*; head length to tip of labrum (1.32) 1.52-1.57, without mandibles (1.01-1.04), long diameter of eye (0.31-0.33), short diameter (0.28-0.31), distance from the lower margin of the head (0.15-0.16); ocellus length (0.15), width (0.104-0.106), distance from the eye (0.03-0.04); pronotum length (0.72)-0.81, width (1.22) 1.33-1.44. (Holmgren, 1913) ...
... **C. ceylonicus** Holmgren

6. *Ocellus almost round; head yellowish brown*, nearly round; antennae with 19 articles, the second slightly longer than the third, the fourth a little shorter than the second, the third and fourth subequal; pronotum shallowly concave anteriorly, posteriorly not emarginate; head length to tip of labrum (1.24-1.26) 1.37, without mandibles (1.04-1.09), width 1.18 (1.28-1.35); long diameter of eye (0.31-0.33), short diameter (0.28-0.31), distance from the lower margin of the head (0.13-0.15); ocellus length (0.13-0.15), width (0.11-0.13), distance from the eye (0.03-0.05); pronotum length 0.60(0.65-0.70), width 1.06(1.17-1.24). (Holmgren, 1913) ...
... **C. travians** (Haviland)

Ocellus oval; head dark brown: eyes not quite round; antennae with (20)-22 articles, the second one-and-a-half times as long as the third, the latter slightly shorter than the fourth; postclypeus nearly three times as wide as long; pronotum slightly emarginate anteriorly, rather distinctly emarginate posteriorly; head length to tip of labrum (1.32) 1.44-(1.56), without mandibles (1.06-1.20), width (1.32) 1.33-1.44; long diameter of eye (0.32-0.40), short diameter (0.30-0.36); ocellus length (0.14-0.20), width (0.08-0.12),

distance from the eye (0.03-0.05) ; pronotum length (0.68)0.72-
(0.76), width (1.20)1.22-1.33. (Holmgren, 1913) ...
... .. **C. heimi** (Wasmann)

Soldiers

1. *Large species ; head width 1.34-1.52 ; head broadly oval, flat ; antennae with 14-16 articles, the second more than twice as long as or slightly longer than the third ; labrum extending to the middle of the mandibles ; pronotum distinctly emarginate anteriorly and posteriorly ; head length with mandibles (2.39)2.47-2.65, without mandibles (1.48-1.56)1.59-1.62, maximum width 1.34 (1.35)-(1.43)1.52, width at the base of mandibles (0.78-0.83), height (0.93-0.98) ; postmentum length (0.93), width (0.39-0.44) ; pronotum length (0.48)-0.53, width (0.93)0.99-(1.01)1.06. (Holmgren, 1913) **C. curvignathus** Holmgren**

Smaller species ; head length without mandibles not exceedidg 1.32

... .. 2

2. *Cutting edge of the right mandible markedly convex ; antennae with 13 articles ; pronotum with anterior margin broadly arcuate ; head length 1.18-1.32, maximum width 1.00-1.03, minimum width 0.68-0.71 ; pronotum length 0.35-0.38, width 0.70-0.73. (Davis, 1929)*

... .. **C. borneensis** Oshima

Cutting edge of the right mandible not convex 3

3. *Abdominal tergites with distinct rows of bristles, 4*

Abdominal tergites with uniformly scattered bristles or at the most with a single row of bristles at the posterior margin 5

4. *Anterior row of bristles only slightly shorter than the posterior row ; head yellowish, slightly darker anteriorly, oval ; antennae with 14*

*Oshima's *Coptotermes flavicephalus* cannot be distinguished from *C. curvignathus*. There is a complete overlap between the measurements of the two species ; other characters are also identical. The measurements of the specimens of *flavicephalus* in the author's collection from the Type locality—Los Baños, Luzon, Philippines, determined by Oshima himself and therefore most probably Paratypes, are as follows: head length with mandibles 2.36-2.49, without mandibles 1.56-1.66, width (maximum) 1.37-1.56, width at the base of mandibles 0.83-0.85, height 0.98; postmentum length 0.96-0.98, width 0.39-0.41 ; pronotum length 0.45-0.49, width 0.96-1.09. The measurements by Oshima are: head length with mandibles 2.66, without mandibles 1.59-1.70, width 1.44-1.59, pronotum width 1.03-1.09. I, therefore, consider *flavicephalus* as synonymous with *C. curvignathus*.

articles, the second slightly longer than the third, the third and fourth subequal; mandibles slightly incurved apically, inner edge straight; pronotum slightly emarginate anteriorly and posteriorly; head length with mandibles (1.82-2.12)-2.20, without mandibles (1.12)1.33-(1.37)1.48, width (0.97)1.04-(1.17)1.18; postmentum length (0.73-0.87), width (0.35-0.42); pronotum length (0.37)0.42-(0.47), width (0.72)0.76-0.84(0.89). (Holmgren, 1913) ...

... .. **C. heimi** (Wasmann)

Anterior row of bristles distinctly shorter than the posterior row, comprising a few bristles only; antennae with 14-(15) articles, in specimens with 15 articles the second and third subequal, the fourth slightly shorter than the third; head length with mandibles 1.94-(2.09-2.31), without mandibles 1.14(1.27)-(1.32)1.33, maximum width (1.40)1.06-(1.11)1.19, width at the base of mandibles (0.66-0.67); long diameter of the frontal tube (0.15), short diameter (0.13); postmentum length (0.85-0.91), median width (0.39); pronotum length 0.37-(0.39-0.40), width 0.68(0.75)-(0.79)0.91. (Holmgren, 1913)

... .. **C. ceylonicus** Holmgren

- | | | | |
|---------------------------------------|-----|-----|-------|
| 5. Height of the head more than 0.85 | ... | ... | ... 6 |
| Height of the head not more than 0.85 | ... | ... | ... 8 |

6. *Width of pronotum 0.65; head yellow, sparsely hairy; antennae with 15 articles, the third slightly shorter and smaller than the fourth; pronotum distinctly emarginate anteriorly, slightly emarginate posteriorly; head length with mandibles 2.20, without mandibles 1.41, width 1.14; pronotum length 0.38. (Holmgren, 1913)*

... .. **C. gestroi** (Wasmann)

Width of pronotum 0.80-0.91 7

7. *Head wider in proportion to length (difference between head length and width 0.03-0.13); height of head 0.91; antennae with 15 articles, the second almost as long as the third, the fourth slightly shorter than the third; pronotum moderately emarginate anteriorly, slightly emarginate posteriorly; head length with mandibles 2.18-2.26, without mandibles 1.35-1.45, width 1.32; maximum width of postmentum 0.39, minimum width 0.23; pronotum length 0.44-0.49, width 0.85-0.91. (All measurements by the author) ...*

... .. **C. sinabangensis** Oshima

Head narrower in proportion to length (difference between head length and width 0.26-0.38); height of head 0.86; antennae with (13)-15

articles, in specimens with 13 articles the second slightly longer than the third, the latter slightly shorter than the fourth; head length with mandibles (2.23)2.28-(2.30)2.47, without mandibles (1.36-1.44)-1.60, width 1.06(1.08)-(1.18)-1.25; postmentum length (0.93), width in the middle (0.22); pronotum length 0.38(0.41)-0.42(0.46), width 0.80-0.87(0.88). (Holmgren, 1913) ... **C. formosanus** Shiraki

8. *Head considerably narrowed anteriorly, almost half as wide at the base of mandibles as posteriorly, only slightly longer than wide; head pear-shaped; antennae with 14 articles, the third shorter than the second and fourth; labrum longer than wide; pronotum with a deep median notch anteriorly, posterior margin with a shallow notch in the middle; head length without mandibles 1.03-1.08, width 0.91-1.03, height 0.69-0.77; length of the left mandible 0.57-0.63; pronotum length 0.37-0.40, width 0.57-0.68.* (Roonwal & Krishna, 1955) ... **C. gaurii** Roonwal & Krishna

Head wider anteriorly, more than half as wide at the base of mandibles as posteriorly 9

9. Head width 0.88-0.96 10
Head width 0.98-1.20 12

10. *Length of the left mandible 0.72-0.79; head light brown, oval, one-and-a-half times as wide behind as in front; antennae with 13 articles, the third as long as the second, in some specimens the third subdivided; pronotum distinctly emarginate anteriorly, slightly emarginate posteriorly; head length with mandibles 1.71-1.84, without mandibles 1.05-1.18, maximum width 0.88-0.96; postmentum length 0.74-0.79, maximum width 0.30-0.35, minimum width 0.13-0.17; pronotum length 0.28-0.35, width 0.57-0.66.* (Ahmad, 1953) **C. emersoni** Ahmad

Length of the left mandible less than 0.70 11

11. *Postmentum strongly constricted in the middle, average narrowest width 0.19, range 0.18-0.22; mandibles distinctly incurved apically; head brownish, sparsely hairy; antennae with 13 articles, the second longer than the third, the third a little shorter than or equal to the fourth; head length without mandibles 1.05-1.08, width 0.90-0.93, height 0.68-0.71; postmentum length 0.60-0.67, widest width 0.33; pronotum length 0.34-0.37, width 0.60-0.67.* (Krishna, 1956) **C. bentongensis** Krishna

*Postmentum slightly constricted in the middle, average narrowest width (0.23) ; mandibles only slightly incurved apically ; antennae with 13-14 articles, the second twice as long as the third, the third shortest, in some specimens the second as long as the third ; head length with mandibles (1.58) 1.59-1.66, without mandibles 1.02-1.06 (1.11), width 0.92(0.93)-0.95(0.96), width at the base of mandibles (0.49-0.52), height(0.70-0.75) ; postmentum length(0.52-0.54), widest width (0.28-0.31) ; pronotum length 0.31-(0.32), width (0.49-0.52) 0.58-0.60. (Kemner, 1934) ... **C. kalshoveni** Kemner*

12. *Mandibles much incurved apically ; head brown ; antennae with 13-14 articles, the second slightly longer than the third, the fourth smaller than the second and third ; labrum reaching up to middle of the mandibles ; mandibles long sabre-shaped ; head length without mandibles 1.13-1.16, width 0.98-1.01, height 0.75-0.79 ; postmentum length 0.68-0.75, widest width 0.33-0.38, narrowest width 0.18-0.23 (average 0.23) ; pronotum length 0.30-0.41, width 0.71-0.75. (Krishna, 1956) ... **C. sepagensis** Krishna*

Mandibles slightly incurved apically ... 13

13. *Postmentum considerably constricted in the middle, slightly less than half as wide in the middle as in front ; head length with mandibles 1.75-1.98, without mandibles 1.18-1.26, width 1.06-1.10 ; pronotum width 0.68-0.72. (Holmgren, 1913) ... **C. parvulus** Holmgren*

Postmentum slightly constricted in the middle, only slightly narrower in the middle than in front ... 14

14. *Pronotum comparatively narrow, width 0.59-0.63, difference between head width and pronotum width 0.39-0.40 ; antennae with 13 articles, the second longer than the third, fourth longer than the third, articles round from the eighth onwards ; pronotum slightly emarginate anteriorly, distinctly emarginate posteriorly ; head length with mandibles 1.80-1.85, without mandibles 1.13-1.22, width 0.99-1.02 ; pronotum length 0.31-0.35. (Kemner, 1934) ...*

... **C. minutissimus** Kemner

Pronotum comparatively wide, width 0.61-0.85, difference between head width and pronotum width 0.28-0.39 ... 15

15. *Mandibles comparatively short, almost as long as half the head length ; head widest in the middle ; antennae with 13-14(15) articles, the second slightly longer than the third ; labrum extending beyond*

the middle of the mandibles ; mandibles slender, slightly incurved apically ; head length with mandibles 1.82-1.98(2.02-2.08), without mandibles (1.19)1.29-(1.35)1.40, maximum width 1.00(1.04)-(1.11)1.20, narrowest width (0.62-0.67) ; length of the left mandible (0.75) ; widest width of postmentum (0.33-0.39), narrowest width (0.23-0.26) ; pronotum length (0.32)0.34-(0.40), width (0.65)0.75-0.80. (Holmgren, 1913) **C. travians** Holmgren

Mandibles comparatively long, distinctly longer than half the head length 16

16. *Head narrower, difference between head length and width (0.24-0.34) ; antennae with 13-16 articles, in specimens with 14 articles the second one-and-a-half times as long as the third ; labrum tongue-shaped, extending beyond the middle of the mandibles ; pronotum weakly emarginate anteriorly and posteriorly ; head length with mandibles (1.89-1.95), without mandibles (1.24-1.30)1.38-1.40, width 1.04-(1.06)1.13, width at the base of mandibles (0.65) ; length of the left mandible 0.82 ; postmentum length (0.74), widest width 0.35-(0.36), narrowest width (0.20)-0.23 ; pronotum length (0.33-0.36)-0.46, width (0.72)-0.80. (Light, 1929) **C. vastator** Light*

Head wider, difference between head length and width 0.15-0.22

... .. 17

17. *Pronotum width (0.67)0.72-0.74 ; antennae with 14 articles, the second more than twice or slightly less than twice as long as the third, the fourth and second subequal ; pronotum shallowly notched anteriorly, antero-lateral corners prominent ; head length with mandibles 2.00-2.10, without mandibles (1.22)1.27-1.35, width (1.04)1.06-1.13, narrowest width (0.62) ; postmentum length (0.80), widest width (0.36), narrowest width (0.20) ; pronotum length (0.33)-0.38. (Kemner, 1934) **C. pregrinator** Kemner*

Pronotum width 0.77-0.85 18

18. *Pronotum shallowly notched anteriorly, anterior margin slightly convex ; labrum longer than wide, terminal hyaline portion elongated, sharply pointed ; head elongately oval ; antennae with 15-18 articles, in specimens with 15 articles the second one-and-a-half times as long as the third ; head length with mandibles 2.01(2.10)-2.22, without mandibles (1.17)1.27-(1.30)1.46, width (0.98)1.06-(1.14)1.20 ; labrum*

length (0.29), width (0.23) ; pronotum length 0.39–(0.41)0.49, width (0.70)0.77–(0.80)0.85. (Kemner, 1934 ; described as *javanicus*) ...
 **C. havilandi** Holmgren

Pronotum deeply notched anteriorly, anterior margin distinctly convex ; labrum as long as wide, terminal hyaline portion short, head rather broadly oval ; antennae with 14 articles, the second almost as long as the third, the third and fourth subequal ; head length with mandibles 2.01(2.02)–2.05, without mandibles (1.24)–1.31, width (1.07–1.09)1.10–1.13 ; width at the base of mandibles (0.65) ; labrum length (0.28), width (0.28) ; pronotum length (0.37–0.39), width 0.77–0.81 (Kemner, 1934) **C. boetonensis** Kemner

Genus *HETEROTERMES* Froggatt

KEY TO THE SPECIES

Imagoes

1. *Ocelli* distinct, separated from the eyes by a distance equal to half their long diameter ; head and pronotum densely hairy ; antennae with 15 articles, the second longer than the third, the fourth somewhat longer than the third, in some specimens the fourth shortest ; pronotum slightly emarginate anteriorly and posteriorly ; body length without wings 4.50–5.00 ; length of forewing 7.50 ; head length to tip of labrum 0.99, without mandibles (0.78), width (0.78)–0.80 ; long diameter of eye (0.20), short diameter (0.15), distance from the lower margin of the head (0.13) ; ocellus length (0.06), width (0.03), distance from the eye (0.03) ; pronotum length 0.38–(0.41), width (0.54)–0.61. (Holmgren, 1913)
 **H. tenuior** (Haviland)

Ocelli either absent or, when present, dot-like, much farther removed from the eyes 2

2. Second article longer than the third 3

Second antennal article shorter than the third ; *ocelli* always present, dot-like ; eyes not quite round, anterior margin straight ; antennae with 15 articles, the second shorter than the third ; pronotum shallowly concave anteriorly, emarginate posteriorly, more densely hairy than the head ; body length without wings 5.00 ; length of forewing 7.50–8.00 ; head length to tip of labrum (0.98)–1.07(1.09), without mandibles (0.80), width 0.80–(0.83) ; long diameter of eye (0.23), short diameter (0.18–0.19), distance from the lower

margin of the head (0.13-0.15) ; pronotum length (0.41-0.46)-0.51, width (0.65-0.67)-0.69. (Holmgren, 1913)... **H. ceylonicus** (Holmgren)

3. *Pronotum not indented anteriorly* ; *ocelli indistinct, dot-like* ; antennae with 16-17(19) articles, the second twice as long as the third, the later shortest ; head length to tip of labrum (1.05)-1.10-(1.27), without mandibles (0.75-0.90), width (0.80)-0.87 ; long diameter of eye (0.20-0.24), distance from the lower margin of the head (0.16-0.20) ; pronotum length (0.46)0.49-(0.55), width (0.70) 0.73-(0.75). (Holmgren, 1913) ... **H. indicola** (Wasmann)

Pronotum indented anteriorly ; *ocelli invariably absent* ; eyes separated from the lower margin of the head by less than their long diameter ; antennae with 13-16 articles, the third shorter than the second, longer than the fourth ; body length without wings 5.00, head length to tip of labrum 1.20, width 0.80, long diameter of eye 0.20, pronotum length 0.50, width 0.70. (Snyder, 1933a) ... **H. malabaricus** Snyder*

Soldiers

1. *Head densely hairy*, hairs short ; antennae with 13 articles, the second longer than the third ; pronotum distinctly notched anteriorly, indistinctly notched posteriorly ; head length with mandibles 1.82, without mandibles (1.22)-1.29, width 0.72 ; length of left mandible (0.78) ; pronotum length 0.30, width (0.44)-0.53. (Holmgren, 1913) ... **H. tenuior** (Haviland)

Head sparsely hairy, with a few scattered hairs ... 2

2. Length of hyaline tip of labrum 0.09 ... 3
Length of hyaline tip of labrum less than 0.09 ... 4

3. *Head subparallel-sided, wider in front than behind* ; *median length of pronotum almost half the width* ; antennae with 12-17 articles, the second slightly longer than the third, often equal to the third and fourth combined ; head length with mandibles 2.18-2.70 ; without mandibles 1.50-1.78, head width 0.98-1.05 ; length of left mandible 0.90-1.05 ; postmentum length 1.13-1.50, widest width 0.30-0.38, narrowest width 0.13-0.19 ; maximum length of pronotum 0.53-0.75 width 0.83-0.90. (Roonwal, 1953) ... **H. gertrudae** Roonwal

*From the description alone it is very difficult to distinguish *Heterotermes malabaricus* Snyder from *H. indicola* (Wasmann).

*Head parallel-sided, not wider at the anterior end than at the posterior end ; pronotum proportionally wider, median length more than half the width ; antennae with 15 articles ; pronotum moderately emarginate both anteriorly and posteriorly ; head length with mandibles (1.89)2.15-(2.21)2.25, without mandibles 1.10(1.17)-(1.43)1.50, width 0.80(0.83)-0.90(0.93) ; pronotum length (0.36)0.42-(0.44)0.50, width (0.59-0.67)0.68-0.78. (Light, 1921) ... **H. philippinensis** (Light)*

4. *Pronotum nearly straight posteriorly, anterior margin straight, with a notch in the middle ; antero-lateral corners broadly rounded, densely hairy ; head parallel-sided, light yellow, with scattered long bristles ; antennae with 12-14 articles, the third shorter than the second ; postmentum twice as wide anteriorly as in the middle ; head length with mandibles 2.40-2.50, without mandibles 1.50, width 0.80-0.85; length of left mandible 0.90; pronotum length 0.40, width 0.60-0.65. (Snyder, 1933a) **H. malabaricus** Snyder*

Pronotum emarginate posteriorly 5

5. *Smaller proportions ; pronotum width 0.49-0.56, length 0.34-0.35 ; head length with mandibles 1.91-2.23, without mandibles 1.09-1.34, width 0.74-0.81 ; antennae with 14 articles, the second slightly longer than the third and fourth ; pronotum deeply notched anteriorly, slightly emarginate posteriorly. (Kemner, 1934) **H. pamatensis** Kemner*

Larger proportions ; pronotum width 0.57-0.83, length 0.34-0.52 ; head length with mandibles 1.90-2.76, without mandibles 1.18-1.84 ; width 0.78-0.99 6

6. *Antennae with 13-14 articles ; smaller proportions ; head length with mandibles 1.98(2.12)-2.51, without mandibles (1.22)1.25-(1.28)1.69, width (0.78)0.81-0.87 (0.88); pronotum width (0.78)0.81-0.87 (0.88). Holmgren, 1913) **H. ceylonicus** Holmgren*

*Antennae with 15 articles (only rarely with 14 articles) ; larger proportions ; head length with mandibles 1.90(2.39)-2.58(2.76), without mandibles 1.18(1.54)-1.79(1.84), width 0.80(0.91)-(0.96)0.99; pronotum length 0.34 (0.44)-0.49 (0.52), width 0.57-0.76 (0.78-0.83). (Holmgren, 1913) **H. indicola** (Wasmann)*

Genus *RETICULITERMES* Holmgren

KEY TO THE SPECIES

Imagoes

1. *Pronotum black or very dark brown* ; head *black or dark brownish black*, densely hairy ; antennae with 17-18 articles, the second nearly twice as long as the third, the latter shortest ; eyes almost round ; ocelli dot-like ; head length to tip of labrum (1.17)-1.25, without mandibles (0.96), width (0.94)-1.15 ; long diameter of eye (0.20)-0.22, short diameter (0.20), distance from the lower margin of the head (0.25) ; ocellus length (0.036), width (0.033), distance from the eye (0.065) ; pronotum length (0.46)-0.55, width 0.95-(1.01). (Snyder, 1923) **R. chinensis** Snyder

Pronotum yellow but with scattered pigmented spots ; head lighter in colour 2

2. *Pronotum yellow but with scattered pigmented spots* ; head densely hairy **H. fukiensis** Light

Pronotum yellow but without pigmented areas ; head sparsely hairy, reddish brown ; antennae with 16-18 articles, in specimens with 16 articles the second one-and-a-half times as long as the third, the third and fourth subequal, in specimens with larger number of articles the third smallest ; head length to tip of labrum (1.09-1.11), without mandibles (0.91-0.96), width 0.93-(0.98)1.03 ; long diameter of eye (0.18), short diameter (0.18), distance from the lower margin of the head (0.18-0.19) ; ocellus length (0.05), width (0.05), distance from the eye (0.07) ; pronotum length 0.43(0.49)-0.50(0.52), width (0.75)0.80-(0.83) 0.90. (Hozawa, 1915) **R. speratus** (Kolbe)

Soldiers

1. *Head index (ratio of width to length) more than 0.64* ; head brownish yellow with a few bristles ; antennae with (15-17) articles, the second almost as long as the third, the fourth shortest ; pronotum scantily hairy, deeply emarginate both anteriorly and posteriorly ; head length with mandibles (2.34-2.47), without mandibles (1.50-1.61) 1.68-1.80, width (1.04-1.06) 1.22-1.24 ; postmentum length (1.06), widest width (0.41), narrowest width (0.13) ; pronotum length (0.41)

0.42-0.47, width (0.75-0.78)0.79-0.84. (Light, 1929) ...

... .. **R. speratus** Kolbe*

Head index 0.64 or less 2

2. *Head length without mandibles 1.85-1.90 ; pronotum distinctly emarginate posteriorly ; head light yellowish brown, with dense long hairs ; antennae with 16 articles, the third short, ring-like, the fourth twice as long as the third ; postmentum twice as wide in front as in the middle ; head length with mandibles 2.60-2.75, width 1.19-1.20 ; pronotum width 0.85. (Snyder, 1923)*
... .. R. chinensis Snyder

Head length without mandibles 1.57 (1.63)-1.68 ; pronotum indistinctly emarginate posteriorly ; head length with mandibles (2.47), width 0.97 (1.01)-1.05 ; pronotum length 0.40-(0.44), width (0.70)0.71-0.80. (Light, 1929) **R. fukiensis** Light

Genus *STYLOTERMES* Holmgren, K. & N.

Single species : **Stylotermes fletcheri** Holmgren, K. & N.

IMAGO : Head dark brown, round, sparsely hairy ; eyes round, slightly bulging ; ocelli separated from the eyes by less than their diameter ; antennae with 18 (?) articles, the second as long as the fourth, the third somewhat longer ; forewing scales large ; radius sector joined with costal margin by several cross veins ; body length without wings 6.50 ; head width 1.52, pronotum length 1.05, width 1.22. (Holmgren, K. & N., 1917).

SOLDIER : head brownish yellow, sparsely hairy ; antennae with 14-15 articles, the third heavily sclerotized, inverted cone-shaped ; labrum semicircular ; mandibles stoutly built ; pronotum halfmoon-shaped, concave anteriorly ; head length with mandibles 4.18, without mandibles 2.66, width 1.71, pronotum width 1.44. (Holmgren, K. & N., 1917).

**Reticulitermes flaviceps* (Oshima), listed in Snyder's Catalogue (1949), is regarded as a synonym of *R. speratus* (Kolbe) by Hozawa (1915). The present author agrees with Hozawa. The measurements of specimens in the the author's collection from Otsu, Japan and indentified as *R. flaviceps* by Dr. Alfred Emerson are as follows : Head length without mandibles 1.53, width 1.31 ; postmentum length 0.91, widest width 0.39, narrowest width 0.13 ; pronotum length 0.41, width 0.78. These measurements overlap almost completely with those of *R. speratus* given above.

Genus *TERMITOGETON* Desneux

KEY TO THE SPECIES

Imagoes

1. *Antennae much longer than the head, articles 3-5 longer than wide; eyes strongly bulging; antennae with 15 articles; ocelli separated from the eyes by their diameter; pronotum very narrow, half the head width; subcosta and radius absent; head length 0.76, width 0.84, pronotum length 0.27, width 0.38, (Holmgren, 1913)*
 **T. planus** (Haviland)
- Antennae only slightly longer than the head, articles 2-7 very short; eyes slightly bulging; antennae with 15 articles; subcosta and radius distinct, median very indistinct. (Holmgren, 1913)*
 **T. umbilicatus** (Hagen)

Soldiers

1. *Head widest in the middle, head length without mandibles (1.43)-1.52, width 1.44-(1.45); head sutures visible; hyaline tip of labrum long; head length with mandibles (2.16)-2.28; pronotum length (0.41)-0.42; width 0.65. (Holmgren, 1913)*
 **T. umbilicatus** (Hagen)
- Head widest below the middle; head length without mandibles (1.06) 1.25, width (1.14)-1.29; head sutures not visible; hyaline tip of labrum very short; antennae with 15 articles, the second longer than the third; head length with mandibles (1.69)-2.20, widest width of postmentum (0.26), narrowest width (0.10); pronotum length (0.33)-0.38, width (0.49)-0.57. (Holmgren, 1913)*
 **T. planus** (Haviland)

Genus *PRORHINOTERMES* Silvestri

KEY TO THE SPECIES

Imagoes

1. *Forewing scales very broad, posterior ends overlapping in the midline; antennae with 16 (?) articles* **P. gracilis** Light
- Forewing scales not abnormally broad, not overlapping in the midline; antennae with more than 16 articles* 2
2. *Pronotum width 1.50; head broadly egg shaped, yellow; ocelli very small, indistinct, very close to the eyes; antennae with 18-21*

articles, the third and fourth smallest, disc-shaped; pronotum with anterior margin weakly concave, posterior margin round; meso- and metanota sharply rounded posteriorly; head length 1.55, width 1.40, pronotum length 0.75–0.85. (Light, 1921)

. **P. tibiaoensis** Oshima*
Pronotum width 1.25–1.30 3

3. *Head length to tip of labrum 1.63; body length without wings 8.00; ocelli close to but not touching the eyes, distance from the eyes (0.03–0.04); head very broadly oval, sparsely hairy, reddish brown; eyes round, distinctly bulging; ocelli oval; antennae with 19–(23) articles, the second twice or one-and-a-half times as long as the third; pronotum kidney-shaped, concave anteriorly, without emargination posteriorly; head length without mandibles (1.01–1.06), width (1.40)–1.41; long diameter of eye (0.36–0.39), short diameter (0.32–0.33), distance from the lower margin of the head (0.109–0.103); ocellus length (0.16–0.18), width (0.122–0.124); pronotum length (0.72)–0.75, width 1.25–(1.27–1.30); length of forewing scale (1.14), width (0.78). (Holmgren, 1913)*

. **P. flavus** (Bugnion & Popoff)

Head length to tip of labrum 1.44; body length without wings 6.20; ocelli almost touching the eyes; head nearly round, light brownish yellow, sparsely hairy; eyes slightly bulging; third antennal article as long as the fourth, somewhat shorter than the second; head width 1.37; pronotum length 0.72, width 1.25. (Holmgren, 1913)

. **P. krakatau** Holmgren

Soldiers

1. *Head width 1.14; pronotum width 0.84; antennae with 13 articles; head oval, fontanelle small, round, situated in the middle of the head; eyes indistinct; third antennal article longer than the second, the fourth as long as the second but slightly shorter than the third; pronotum almost oval, anterior margin convex, not emarginate posteriorly; head length with mandibles 2.24, without mandibles 1.33. (Holmgren, 1913)* **P. krakatau** Holmgren

Head width 1.45–1.90; pronotum width 1.00–1.35; antennae with 15–20 articles 2

*Described under the name of *Prorhinotermes luzonensis* by Light (1921). See Snyder (1949).

2. *Antennae with 15-16 articles; head width 1.25-1.35; head pale yellow posteriorly, slightly darker anteriorly; eyes vestigial, not protruding at all, represented by a vague whitish area; third antennal article obconic, strongly sclerotized; head length with mandibles 2.30-2.60, without mandibles 1.45-1.60, width at the base of mandibles 0.90-0.95; pronotum length 0.45-0.50, width 1.00-1.05* (Light, 1921) **P. gracilis** Light
Antennae with 17-19 articles; head width 1.37-1.65 3
3. Head yellow, abdomen much lighter 4
Head reddish yellow, abdomen yellowish; head oval, distinctly narrowed anteriorly; antennae with 18-20 articles, the third nearly as long as or shorter than the second; pronotum deeply concave anteriorly, antero-lateral lobes small, rounded, posterior margin without emargination; head length with mandibles (2.54) 2.77-(2.91) 2.96, without mandibles (1.56) 1.63-(1.76) 1.79, width 1.37-1.52(1.56); eye length (0.31), width (0.23); fontanelle from the anterior margin of the head (0.44-0.52); postmentum length (1.09), widest width (0.41-0.52), narrowest width (0.20-0.26); pronotum length 0.46-(0.52) 0.57, width (1.09) 1.10-1.22(1.30); mesonotum width (1.09-1.35); metanotum width (0.98-1.24). (Holmgren, 1913) **P. flavus** (Bugnion & Popoff)*
4. *Pronotum width 1.25-1.35; head with posterior margin straight, postero-lateral corners rounded; fontanelle circular, channel in front of it of the same diameter; antennae with 18-20 articles; postclypeus more than twice as wide as long; labrum short, tongue-shaped; eyes distinct, hyaline, protruding; pronotum with a midlongitudinal groove, antero-lateral corners shortly rounded, posterior margin with a slight concavity in the middle; mesonotum widest in the middle and metanotum near the posterior end; head length with mandible 2.50-3.00, without mandible 1.60-1.90, width 1.40-1.65, width at the base of mandibles 1.00; pronotum length 0.55-0.65.* (Light, 1921) **P. tibiaoensis** (Oshima)
Pronotum width 1.05-1.18; antennae with 17 articles; head length with mandibles 2.47-2.85, without mandibles 1.59-1.79, width 1.48; pronotum length 0.53-0.57.

*The colour character on which the identification of *Prorethinos termites flavus*, *P. japonicus* and *P. tibiaoensis* is based is not a reliable one. As Light (1921) has already hinted they could be just one species showing geographic variation. The measurements and the number of antennal articles do not help much in the identification of these species.

Genus *PARRHINOTERMES* Holmgren

Imago

Parrhinotermes aequalis Holmgren : Head round, thinly hairy, light brown ; ocelli separated from the eyes by a distance considerably less than their diameter ; third antennal article indistinctly longer than the second ; pronotum kidney-shaped, slightly emarginate posteriorly ; head width 1.18 ; pronotum length 0.53, width 0.99. (Holmgren, 1914)

Soldiers

1. *First marginal tooth on the left mandible leaf-like, not triangular ; right mandible with a short, stump-like tooth ;* head oval, widest in the middle ; antennae with 13 articles, the third nearly twice as long as the second and one-and-a-half times as long as the fourth ; labrum longer than wide, antero-lateral corners rounded ; second marginal tooth on the left mandible short, sharply pointed, triangular ; pronotum convex anteriorly, slightly concave posteriorly ; head length with mandibles 1.98, without mandibles (1.32)–1.44, width 1.18–(1.19) ; postmentum length (0.80), widest width (0.28), narrowest width (0.15) ; pronotum length 0.38–(0.39), width (0.67)–0.68. (Holmgren, 1913) **P. inaequalis** (Haviland)

First marginal tooth on the left mandible not leaf-like, sharply pointed, triangular ; right mandible with a sharply pointed tooth 2

2. *Second marginal tooth on the left mandible reduced (much smaller than the first marginal) ; tooth of the right mandible placed in the middle ;* antennae with 13 articles ; labrum as long as wide, broadly curved apically ; pronotum not indented anteriorly ; head length with mandibles 1.71, without mandibles (0.98–1.04)–1.25, width 0.95–(0.96) ; postmentum length (0.70), widest width (0.28), narrowest width (0.15) ; pronotum length (0.29–0.31)–0.34, width (0.57–0.59)–0.61. (Holmgren, 1913) **P. aequalis** (Haviland)

Second marginal tooth on the left mandible not reduced (almost as large as the first marginal) ; tooth on the right mandible more anteriorly placed 3

3. *Tooth on the right mandible placed beyond the outer third, near the tip ;* head yellowish brown, broad, flat and squarish, narrowed anteriorly ; sparsely hairy ; antennae with 13 articles, the second shortest ; labrum elongate, finger-shaped, extending up to the tip of the mandibles ; pronotum flat, trapezoid, anterior margin convex, posterior margin nearly straight ; length of head without

mandibles 1.20-1.32, width 1.02-1.14 ; length of left mandible 0.66-0.78 ; postmentum length 0.90-1.08, widest width 0.30-0.36, narrowest width 0.18 ; pronotum length 0.36-0.48, width 0.66-0.72. (Roonwal and Sen-Sarma, 1956)

... .. **P. khasii** Roonwal and Sen-Sarma

*Tooth on the right mandible placed more posteriorly, in the apical third ; head moderately hairy, with short and long hairs, reddish brown ; antennae with 13 articles, the second slightly shorter than the third, the fourth slightly longer than the third ; pronotum indistinctly emarginate anteriorly ; head length with mandibles (1.43)-1.56, without mandibles (0.98)-1.10, width (0.88)-0.91 ; widest width of postmentum (0.28) ; pronotum length (0.28), width (0.52)-0.53. (Holmgren, 1914) ... **P. buttel-reepenl** (Holmgren)*

Genus *SCHEDORHINOTERMES* Silvestri

KEY TO THE SPECIES

Imagoes

1. Head width 2.24-2.93 ; pronotum width 1.94-2.73 2
Head width up to 1.90 ; pronotum width up to 1.71 3
2. *Larger species ; head width 2.93 ; pronotum width 2.73 ; head rust yellow ; ocelli separated from the eyes by half their diameter ; antennae with 20 articles, the third nearly twice as long as the second ; body length without wings 11.50 ; head length 2.58 ; pronotum length 1.60. (Holmgren, 1913)*
... .. **S. maximus** (Holmgren)
*Smaller species ; head width 2.24 ; pronotum width 1.94 ; antennae with 21 articles ; body length without wings 8.00-11.00 ; length of forewing 14.50-15.50. (Holmgren, 1914) ... **S. butteli** (Holmgren)*
3. *Ocelli very small, separated from the eyes by more than their long diameter ; wings dark brown, scales lighter ; head sparsely hairy ; body length without wings up to 8.00 ; length of forewing 8.00 ; head length 1.75, width 1.67 ; pronotum length 0.84, width 1.52. (Holmgren, 1913)*
... .. **S. brevialtus** (Haviland)
Ocelli larger, separated from the eyes by a distance as long as or shorter than their long diameter 4
4. *Ocelli separated from the eye by a distance distinctly less than their short diameter, distinctly oval* 5

Ocelli separated from the eyes by a greater distance, very broadly oval to almost round 6

5. *Basal portion of wing dark brown; head brown; body yellowish; body length without wings 8.00; head length to tip of labrum 1.56–1.67; pronotum length 0.74–0.81, width 1.71. (Holmgren, 1913)*
 **S. celebensis** (Holmgren)

Basal portion of wings slightly dark, rest hyaline; head brownish yellow, sparsely hairy eyes bulging; antennae with 20 articles, the second nearly as long as the third or slightly shorter, the fourth shortest; head length to tip of labrum 1.67–1.87, length up to tip of clypeus (1.50), length without mandibles (1.50), width 1.67 (1.71)–1.90; long diameter of eye (0.49), short diameter (0.41), distance from the lower margin of the head (0.13); ocellus length (0.18), width (0.13), distance from the eye (0.07); pronotum length 0.80 (0.81)–0.90, width (1.40) 1.48–1.63. (Holmgren, 1913) ...
 **S. translucens** (Haviland)

6. *Ocelli separated from the eyes by almost their long diameter; head brown, round, flat; eyes round, not much bulging; antennae with 20 articles, the third longer, thicker than the second; labrum tongue-shaped, nearly as long as wide; pronotum slightly kidney-shaped, straight anteriorly, slightly emarginate posteriorly; body length without wings 7.50–8.20; length of forewing 10.20–11.00; head width 1.52–1.77, pronotum length 0.81–0.87, width 1.38–1.45. (Kemner, 1934)* **S. javanicus** Kemner

Ocelli closer to eyes (distance from the eyes 0.10) ... 7

7. *Head length to tip of labrum 1.77–1.80; eyes strongly bulging; ocelli very broadly oval; the third antennal article slightly longer than the second, the fourth shortest; head length to tip of clypeus (1.60), width (1.71) 1.77–1.80; long diameter of eye (0.42), short diameter (0.39), distance from the lower margin of head (0.15); ocellus length (0.137), width (0.120), distance from the eye (0.10); pronotum length (0.78)–0.88, width (1.40) 1.45–1.46. (Kemner, 1934)*
 **S. makassarensis** Kemner

Head length to tip of labrum 1.61–1.63 8

8. *Pronotum proportionately wider (difference between head width and pronotum width 0.07–0.19); head brownish yellow, basal third of wings brown, rest hyaline; eyes strongly bulging; ocelli almost round; antennae with (20) articles, the third slightly shorter than the second, the fourth and second almost subequal; pronotum not*

emarginate anteriorly, slightly depressed posteriorly in the middle ; head length to tip of labrum (1.63), without mandibles (1.27), width 1.56-(1.63) ; long diameter of eye (0.46), short diameter (0.40), distance from the lower margin of the head (0.13) ; ocellus diameter (0.13), distance from the eye (0.10) ; diameter of fontanelle (0.05), fontanelle from postclypeus (0.26) ; pronotum length (0.75)-0.84, width (1.44)-1.49. (Kemner, 1933) ... **S. leopoldi** Kemner

*Pronotum proportionally narrower (difference between head width and pronotum width 0.31-0.48) ; head with a few long bristles in the centre, the rest without bristles, area around fontanelle depressed ; eyes almost round ; ocelli very broadly oval ; antennae with (20) articles, the second distinctly longer or slightly shorter than the third, the third and fourth almost subequal, articles beyond the sixth much wider than long, with very long bristles ; pronotum more hairy than the head, margin with a row of long bristles, indistinctly emarginate anteriorly and posteriorly ; basal portion of wing dark, rest hyaline ; head length to tip of labrum (1.61-1.63), without mandibles (1.27-1.32), width (1.61-1.70)-1.71 ; long diameter of eye (0.41-0.44), short diameter (0.39), distance from the lower margin of the head (0.13-0.15), ocellus length (0.13-0.15), width (0.11-0.13), distance from the eye (0.10) ; pronotum length (0.78-0.80), width 1.22-(1.30-1.37). (Holmgren, 1914). ... **S. medioobscurus** (Holmgren)*

Major Soldiers

1. Large species ; head length with mandibles 3.08-3.42, width 2.14-2.64
 2
 Small species ; head length with mandibles up to 2.75, width up to
 1.96 3
2. *Antennae with 16 articles, the third nearly twice as long as the second ; pronotum slightly emarginate posteriorly ; mesonotum slightly narrower and metanotum slightly wider than pronotum ; head reddish brown ; pronotum convex anteriorly ; head length with mandibles 3.08-(3.26), without mandibles 2.28-2.32 (2.34), width 2.14-2.20 (2.34) ; widest width of postmentum (0.52), narrowest width (0.28) ; pronotum length 0.67-0.68(0.80), width 1.22-(1.42) ; mesonotum width (1.38) ; metanotum width (1.44). (Holmgren, 1913) ...*
 **S. malaccensis** (Holmgren)

Antennae with 17 articles, the third somewhat longer than the second ; pronotum deeply emarginate posteriorly ; meso- and metanota distinctly wider than pronotum ; head length with mandibles 3.42,

without mandibles (2.23) 2.24-2.52, width 2.00(2.30)-2.64 ; pronotum length 0.61(0.78)-0.81, width (1.30)1.35-1.56 ; mesonotum width (1.32) ; metanotum width (1.35). (Holmgren, 1913) ...

... .. **S. sarawakensis** (Holmgren)

3. *Head length with mandibles 2.75, without mandibles 2.02 ; pronotum width 1.30 ; head subrectangular ; third antennal article nearly twice as long as the second ; labrum rather distinctly bilobed anteriorly ; right mandible with two marginal teeth ; postmentum twice as wide anteriorly as in the middle ; pronotum not emarginate anteriorly, distinctly emarginate posteriorly ; head width 1.96 ; widest width of postmentum 0.52, narrowest width 0.26 ; pronotum length 0.68, width 1.30 ; mesonotum width 1.18 ; metanotum width 1.18.* (All measurements by the author)

... .. **S. bidentatus** (Oshima)

Head length with mandibles up to 2.49, without mandibles 1.88 ;
pronotum width 1.11 4

4. Head length without mandibles 1.60-1.88 5

Head length without mandibles up to 1.54 6

*5. *Head more narrowed at the base of mandibles, narrowest width 1.09 ; pronotum slightly emarginate posteriorly ; antennae with 16 articles, the second almost as long as the third ; labrum extending up to the three-fourths of the mandible, broadly rounded ; head length with mandibles 2.41-2.47, without mandibles 1.69-1.71, width 1.61-1.74 ; postmentum length 1.06, widest width 0.49, narrowest width 0.28 ; pronotum length 0.52-0.54, width 0.98-1.06 ; mesonotum width 1.01-1.06 ; metanotum width 1.06-1.08.* (All measurements by the author) **S. brevialtus** (Haviland)

Head less narrowed at the base of mandibles, narrowest width 1.17 ; pronotum not emarginate posteriorly ; antennae width 16-17 articles, in specimens with 16 articles the third one-and-a-half times as long as the second ; head length with mandibles (2.41)-2.47, without mandibles 1.60(1.61)-(1.74)1.88, width 1.49(1.69)-(1.71)1.84 ; postmentum length (1.11), widest width (0.41), narrowest width (0.28) ; pronotum length 0.49-0.57(0.62), width 0.95(1.04)-1.10 (1.11) ; mesonotum width (1.04-1.14), metanotum width (1.09-1.16). (Holmgren, 1913) **S. translucens** (Haviland)

**Schedorhinotermes brevialtus* and *S. translucens* are close to each other and their identification on the basis of soldier caste is difficult.

6. *Labrum extending up to almost the tip of the mandibles*; antennae with 16 articles, head length with mandibles 1.98, without mandibles 1.44-1.54, width 1.38-1.44; pronotum length 0.43-0.46, width 0.72-0.82. (Holmgren, 1913) ... **S. longirostris** (Brauer)

Labrum shorter, extending up to the three-fourths of the mandibles

... .. 7

7. *Antennae with 17 articles, the second slightly longer than the third, the fourth slightly shorter than the third*; pronotum slightly emarginate posteriorly; head length with mandibles 2.34-2.38, without mandibles 1.45-1.56, width 1.48-1.62; widest width of postmentum 0.44, pronotum length 0.52-0.57, width 0.91-0.93; mesonotum width 0.85-0.94; metanotum width 0.93-1.04. (All measurements by the author) ... **S. medioobscurus** (Holmgren)

Antennae with 16 articles (rarely with 15 articles), the second shorter than the third 8

8. *Postmentum narrower in the middle than at the anterior tip; lateral sides of pronotum rather broad*; head yellowish red; antennae with 16 articles, the third longer than second; labrum slightly bilobed, furrowed in the middle; head length with mandibles 2.15-2.30, without mandibles 1.48-1.52, width 1.38-1.41; pronotum length 0.49-0.53, width 0.74-0.81. (Kemner, 1934)

... .. **S. javanicus** Kemner

Postmentum wider in the middle than at the anterior tip; lateral sides of pronotum angularly rounded; antennae with 15-16 articles; head length with mandibles 2.18-2.37, without mandibles 1.34-1.52, width 1.38-1.52, pronotum length 0.49-0.55, width 0.67-0.92. (Kemner, 1934) **S. makassarensis** Kemner

Minor Soldiers

1. *Head length with mandibles 2.01, without mandibles 1.35-1.47*; antennae with 16 articles, the third longer than the second; head width 1.17; pronotum length 0.47-0.56, width 0.77-0.86. (Holmgren, 1913) **S. sarawakensis** (Holmgren)

Head length with mandibles up to 1.80, without mandibles up to 1.26 2

2. *Head length with mandibles 1.17-1.18, without mandibles 0.65-0.72*; antennae with 15 articles, the second twice as long as the third, the latter shortest; labrum extending a little beyond the mandi-

bles ; head length to tip of labrum 1.22, width 0.67-0.70 ; pronotum length 0.29-0.31, width 0.41-0.44 ; mesonotum width 0.41-0.42 ; metanotum width 0.52-0.53. (All measurements by the author) ... **S. tarakensis** (Oshima)

Head length with mandibles up to 1.80, without mandibles up to 1.26 ... 3

3. Head length with mandibles 1.67-1.80, without mandibles 1.04-1.26, width 0.91-1.04 ... 4

Head length with mandibles up to 1.60, without mandibles up to 1.07, width up to 0.91 ... 5

4. *Labrum extending almost up to the tip of mandibles* ; antennae with 16 articles, the second almost as long as the third, the fourth shortest ; head length with mandibles 1.80, without mandibles 1.08, width 1.04 ; pronotum length 0.43, width 0.79 ; mesonotum width 0.82 ; metanotum width 0.86. (All measurements by the author) ... **S. bidentatus** (Oshima)

Labrum shorter, not extending up to the tip of mandibles ; antennae with 15-16 articles, the second almost as long as or slightly longer than the third, pronotum indistinctly emarginate posteriorly ; head length with mandibles 1.67-(1.71), without mandibles (1.04)1.18-1.26, width 0.91-(1.01)1.02 ; postmentum length (0.65), widest width (0.36), narrowest width (0.26) ; pronotum length 0.44-0.48 (0.49), width (0.57) 0.67-0.73 ; mesonotum width (0.72), metanotum width (0.80). (Holmgren, 1913) ... **S. malaccensis** (Holmgren)

5. *Labrum extending beyond the tip of mandibles* ; antennae with 14-15(16) articles, in specimens with 16 articles the second slightly longer than the third, the fourth shortest ; postmentum strongly arched in the middle, only slightly narrowed in the middle ; head length with mandibles 1.33-(1.40), without mandibles 0.84-(0.88) 1.04, width 0.72-0.80 ; widest width of postmentum (0.26), narrowest width (0.22) ; pronotum length 0.33-(0.41)0.42, width 0.47-(0.57) 0.60 ; mesonotum width (0.62) ; metanotum width (0.65). (Holmgren, 1913) ... **S. longirostris** (Brauer)

Labrum not extending beyond the tip of mandibles ... 6

6. *Head length with mandibles* 1.24-1.35, *without mandibles* 0.78-0.83 ; antennae with 16 articles, the second slightly longer

than the third, the fourth shortest; labrum extending up to the tip of mandibles; postmentum strongly arched, widest in the middle; head width 0.70-0.75; widest width of postmentum (0.26); pronotum length 0.36-0.39, width 0.52-0.57. (All measurements by the author) ... **S. medioobscurus** (Holmgren)

Head length with mandibles 1.37-1.60, without mandibles 0.85-1.07 7

7. *Pronotum narrower in proportion to length, (difference between pronotum width and length 0.11-0.15; head with a few long bristles; antennae with 15-16 articles, in specimens with 15 articles the third slightly shorter than the fourth, in specimens with 16 articles the third longer than the fourth, the latter shortest; pronotum with anterior margin slightly produced in the middle, lateral sides broadly rounded; head length with mandibles 1.41-1.52, without mandibles 0.85-0.90, width 0.74-0.82, pronotum length 0.38, width 0.49-0.53. (Kemner, 1934) ... **S. javanicus** Kemner*

Pronotum wider in proportion to length, difference between pronotum width and length 0.17-0.22 8

8. *Lateral sides of pronotum narrowly rounded; antennae with 15-16 articles, labrum not extending beyond the tip of mandibles; lateral sides of meso- and metanota narrowly rounded; head length with mandibles (1.37)-1.48, without mandibles (0.80)0.85-0.92, width 0.77-(0.80)0.81; widest width of postmentum (0.23), pronotum length (0.37)0.39-0.40, width (0.54)0.56-0.57; mesonotum width (0.54); metanotum width (0.57). (Kemner, 1934)*

... .. **S. makassarensis** Kemner

*Lateral sides of pronotum broadly rounded; antennae with 16 articles, the second almost as long as the third or slightly shorter; head length with mandibles (1.45)1.55-1.60, without mandibles (1.85)0.91-1.07, width 0.73-(0.80)0.91, widest width of postmentum (0.28); pronotum length 0.34-(0.39)0.46, width 0.55-(0.59)0.69; mesonotum width (0.67). (Holmgren, 1913) ... **S. traslucens** Holmgren**

*The minor soldier of *Schedorhinotermes brevis* could not be included in this key because the specimens were not accessible to the author. Holmgren (1913) does not give its measurements. He puts it along with *S. traslucens* in his key.

Family **TERMITIDAE****KEY TO THE GENERA****Imagoes**

1. Left mandible with three marginal teeth, recalling a rhinotermitid, posterior edge of the second marginal tooth of the right mandible concave, subsidiary tooth at the base of the anterior cutting edge of the first marginal tooth conspicuous ... **Protohamitermes**
 Left mandible never with three marginal teeth ... 2
2. Posterior edge of the second marginal tooth of the right mandible straight ... 3
 Posterior edge of the second marginal tooth of the right mandible concave ... 17
3. Right mandible with a small but distinct subsidiary tooth at the base of the anterior cutting edge of the first marginal tooth ; labrum longer than wide ; antennae with 19 articles, the second as long as or shorter than the third ; very large species ...
 ... **Macrotermes**
 Right mandible without subsidiary tooth ... 4
4. Labrum longer than wide, with a sclerotized transverse band ; left mandible with a deep cut between the two marginal teeth, posterior cutting edge of the first marginal tooth long and curved at the posterior end ... 5
 Labrum as long as or shorter than wide, without the transverse band; left mandible without a deep cut between the two marginal teeth ... 6
5. Wings unusually long, with a network of veinlets between median and radius sector ; antennae with 15-18 articles ; clypeus strongly arched, as long as or longer than wide, posteriorly strongly convex, lighter than rest of the head; small species ... **Microtermes**
 Wings not unusually long ; antennae with 19-20 articles, clypeus not extraordinarily arched, not much lighter than the rest of the head ; large species ... **Odontotermes**
6. Left mandible with only one marginal tooth, the posterior cutting edge of the marginal tooth long, broadly rounded posteriorly ; head nearly circular ; postclypeus as long as half its width ...
 ... **Amitermes**

- Left mandible with two marginal teeth 7
7. Head narrowed anteriorly, broadly oval or round 8
- Head not narrowed anteriorly, somewhat parallel-sided; cutting edge between the two marginal teeth of the left mandible concave; eyes and ocelli small; antennae with 13-14 articles; pronotum much smaller than the head, saddle-shaped
... .. **Microcerotermes**
8. Tibial spine arrangement 3:2:2; left mandible with an indistinct cut in front of the second marginal tooth; wings dark; postclypeus much shorter than half its width 9
- Tibial spine arrangement 2:2:2; left mandible without any cut in front of the second marginal tooth; wings hyaline ... 10
9. Left mandible with the apical tooth as long as the first marginal tooth; wings hairy and spiny; ocelli separated from the eyes by their diameter **Globitermes**
- Left mandible with the apical tooth shorter than the first marginal tooth; wings finely hairy; ocelli separated from the eyes by a distance less than their diameter; eyes large; pronotum slightly saddle-shaped; foretibiae with the third spine reduced
... .. **Prohamitermes**
10. Left mandible with the apical tooth considerably reduced; third antennal article twice as long as the second; clypeus shorter than half its width; fontanelle distinct, oval, whitish; dark coloured species
... .. **Hospitalitermes**
- Left mandible with the apical tooth well-developed ... 11
11. Postclypeus only slightly shorter than half its width, strongly arched, reddish yellow, (rest of the head dark), posterior margin strongly convex; left mandible with the apical and the first marginal teeth subequal and closely placed **Trinervitermes**
- Postclypeus much shorter than half its width 12
12. Postclypeus much lighter in colour than frons; small species, rarely more than 15.00 mm. long with wings and 8.00 mm. without wings; left mandible with the apical tooth slightly smaller than the first marginal tooth **Nasutitermes**

Postclypeus little, if any, lighter in colour than frons ; larger species, usually more than 16.00 mm. long with wings and 9.00 mm. without wings 31

13. Third antennal article nearly three times as long as the second ; ocelli approximated to the eyes ; left mandible with the apical tooth distinctly smaller than the first marginal tooth **Longipeditermes**

Third antennal article little, if any, longer than the second ... 14

14. Fontanelle large, conspicuous 15
Fontanelle small, crevis-like 16

15. Fontanelle triradiate ; left mandible with a rather wide angle between the apical and the first marginal teeth (approximately 60°) ; ocelli separated from the eyes by a distance slightly greater than their diameter **Havilanditermes**

Fontanelle oval ; left mandible with a narrower (approximately 45°) angle between the apical and the first marginal teeth... **Bulbitermes**

16. Fontanelle distinct, slit-like, white ; ocelli large, projecting, separated from the eyes by half their short diameter ; postclypeus less than one-fourth as long as wide, swollen, head strongly hairy ; third antennal article usually slightly shorter than the second ; left mandible with the apical tooth shorter than the first marginal tooth **Grallatotermes**

Fontanelle indistinct ; ocelli small, almost flat ; head sparsely hairy ; left mandible with the apical tooth distinctly smaller than the first marginal tooth **Lacessititermes**

17. Left mandible with the apical tooth as long as or shorter than the first marginal tooth 18

Left mandible with the apical tooth distinctly longer than the first marginal tooth 19

18. Tibial spine arrangement 3:2:2 ; left mandible with a wide angle (approximately 80°) between the first marginal and the apical teeth ; postclypeus slightly shorter than half its width ; meso- and metanotal processes sharply pointed ; eyes small, bulging **Eurytermes**

Tibial spine arrangement 2:2:2 ; left mandible with a narrower (about 45°) angle between the apical and the first marginal teeth ; third antennal article as long as the second ... **Speculitermes**

19. Left mandible with the apical and the first marginal teeth widely separated ; cutting edge between them straight or very shallowly concave ; the apical tooth considerably longer than the first marginal tooth, mandibles elongated, molar area greatly reduced, only slightly projecting ... 20

Left mandible with the apical tooth close to the first marginal tooth, cutting edge between them sinuate, the last marginal tooth prominent ; mandible shorter, molar area well developed, considerably projecting ... 21

20. Right mandible with the posterior edge of the second marginal tooth very slightly concave ... **Synhamitermes**

Right mandible with the posterior edge of the second marginal tooth deeply concave ... **Eremotermes**

21. Tibial spine arrangement 2:2:2 ; antennal articles numbering up to 13 ; apical tooth broad ; right mandible with the two marginal teeth approximated ; head oval ; fontanelle distinct ; located in the middle of the head ... **Subulitermes**

Tibial spine arrangement 3:2:2 ; antennae with 14-17 articles ... 22

22. Right mandible with the second marginal tooth conspicuous, round or pointed ... 23

Right mandible with the second marginal tooth greatly reduced ; left mandible with the two marginal teeth very close to each other ; post clypeus large, almost half as long as wide, moderately arched ; fontanelle raised, small but distinct ... **Termes**

23. Left mandible with an obtuse angle between the apical and the first marginal teeth ; head broadly oval ; eyes rather small ; antennae with 14 articles ; postclypeus shorter than half its width ; styli absent ... **Procapritermes**

Left mandible with an acute angle between the apical and first marginal teeth ... 24

24. Posterior edge of the first marginal tooth of the left mandible long, almost straight, the other marginal tooth small, broadly rounded ... **Pseudocapritermes**

Posterior edge of the first marginal tooth short, sinuate, the other marginal tooth large, sharply pointed ... 25

25. Second marginal tooth of the right mandible pointed, large, only slightly smaller than the first marginal tooth ... **Homallotermes**

Second marginal tooth of the right mandible low, distinctly smaller than the first marginal tooth; antennae with 14-15 articles; meso- and metanota considerably narrowed posteriorly; radius absent ... **Capritermes**

Soldiers

1. Mandibles degenerated, nonfunctional, head drawn out into a long nasus with the fontanelle opening at its tip (nasute forms) ... 2

Mandibles well developed, functional; head not produced into a long nasus ... 12

2. Mandibles without or with an inconspicuous apical portion, the latter more or less knob-like ... 3

Mandibles with a well-developed apical portion ... 4

3. Soldiers dimorphic; large species; head very broadly rounded behind; not constricted at the base of the antennae; nasus cylindrical; antennae with 13-14 articles ... **Trinervitermes**

Soldiers monomorphic, small species; head not extraordinarily rounded behind; antennae with 12 articles ... **Subulitermes**

4. Mandibles with two small teeth at the base of the apical portion; head slightly constricted behind the antennae, slightly depressed at the base of the nasus, the latter conical; antennae long; body very strongly hairy ... **Hirtitermes**

Mandibles with one or without tooth on the apical portion ... 5

5. Mandibles with a tooth on the long apical portion; head greatly produced behind, greatly depressed at the base of the nasus; third antennal article as long as the fourth, antennae with 14 articles; legs greatly elongated; soldiers dimorphic ... **Longipeditermes**

Mandibles without any tooth on the apical portion ... 6

6. Head greatly produced behind, strongly depressed at the base of the nasus, strongly constricted behind the antennae ... 9

Head not greatly produced behind ... 7

7. Antennae short ; head not depressed, not at all produced behind ;
not constricted behind the antennae ... **Nasutitermes**
Antennae long 8
8. Antennae with 12 articles ; nasus thick, conical ; very small species ;
head distinctly constricted behind the base of the antennae, depressed
at the base of the nasus **Ceylonitermes**
9. Nasus short, broad, conical ; hind femora considerably shorter than
the abdomen ; antennae with 13 articles ... **Grallatotermes**
Nasus long, slender 10
10. Legs greatly elongated ; hind femora as long as or longer than the
abdomen 11
Legs not greatly elongated ; hind femora shorter than the abdomen ;
antennae with 13-14 articles **Bulbitermes**
11. Third antennal article shorter than the fourth ; nasus long, somewhat
thick at the base **Lacessititermes**
Third antennal article longer than the fourth ; nasus short, slender
... .. **Hospitalitermes**
12. Mandibles symmetrical, curved at tip, used for biting ... 13
Mandibles slightly asymmetrical to strongly asymmetrical, slightly
twisted to strongly twisted, used for snapping or snapping and
biting both 23
13. Labrum with a hyaline tip ; meso- and metanota prominently
expanded laterally ; soldiers dimorphic ; head dark, sides strongly
converging anteriorly ; antennae with 16-17 articles ; mandibles
without teeth ; very large species **Macrotermes**
Labrum without hyaline tip ; meso- and metanota not particularly
expanded laterally ; soldiers monomorphic 14
14. Postmentum broad, strongly arched in the middle ; mandibles sabre-
shaped ; left mandible with or without tooth 15
Postmentum narrow, not arched in the middle, flat ... 16
15. Mandibles stout, not particularly concave at the base, left mandible
with a tooth in different positions ; antennae with 15-19 articles
... .. **Odontotermes**

- Mandibles delicate, concave at the base ; antennae with 12-15 articles ;
 very small species, soldiers considerably smaller than the
 workers **Microtermes**
16. Inner margin of mandibles finely serrated throughout ; mandibles long,
 sabre-shaped ; antennae with 12-13 (mostly 13) articles ; labrum
 very small ; head elongated, only slightly narrowed anteriorly,
 sides either almost parallel or slightly convex
 **Microcerotermes**
- Inner margin of mandibles not serrated ; left mandible with one or
 two teeth 17
17. Left mandible with two widely separated teeth ... 18
 Left mandible with a single tooth 19
18. Mandibles slender, small, sabre-shaped, curved ; teeth of the left man-
 dible small ; head oval ; antennae with 14 articles ; labrum trian-
 gular ; tip not hyaline **Prohamitermes**
- Mandibles thick, short, stoutly built ; second tooth on the left
 mandible very small ; head rectangular ; antennae with 13 articles ;
 labrum triangular, tip not hyaline ... **Eurytermes**
19. Head with frontal projection ; mandibles long, slender, almost
 straight, only slightly incurved apically ; antennae with 14 articles ;
 labrum triangular **Eremotermes**
- Head without frontal projection ; mandibles strongly curved, stoutly
 built ; head thick, 20
20. Head rectangular, rather flat ; mandibles short, broad, clypeus
 entire, not bilobed ; fontanelle very indistinct ; teeth small ...
 **Euhamitermes**
- Head mostly narrowed anteriorly, more or less arched ; mandibles
 long ; clypeus entire or bilobed ; fontanelle distinct ... 21
21. Clypeus bilobed ; head considerably longer than wide, narrowed
 anteriorly ; tooth laterally or posteriorly directed, conspicuous
 **Amitermes**
- Clypeus not bilobed 22
22. Mandibles short ; head parallel-sided ; submentum flat
 **Synhamitermes**

- Mandibles long, strongly curved, tooth directed backwards; head as broad as or broader than long **Globitermes**
23. Head with frontal projection 24
 Head without frontal projection 26
24. Mandibles slightly asymmetrical, very long and slender, rod-like, bent downwards, slightly flattened apically on the inner margin, used for biting and snapping 25
 Mandibles distinctly asymmetrical, right mandible straight, left mandible twisted, used for snapping only; labrum long, rectangular, antero-lateral angles produced; antennae with 14 articles
 **Mirocapritermes**
25. Labrum deeply cut; lateral sides convex, base of the antenna without ridge **Angulitermes**
 Labrum shallowly cut, lateral sides almost straight; base of the antenna with a ridge **Termes**
26. Mandibles slightly asymmetrical, left mandible not very strongly bent in the middle, slender 27
 Mandibles very strongly asymmetrical, left mandible strongly twisted in the middle 28
27. Head distinctly narrowed anteriorly; mandibles with tip not bent in the form of a hook **Homallotermes**
 Head very slightly if at all narrowed anteriorly, rectangular, mandibles with tip bent in the form of a hook **Procapritermes**
28. Tip of the left mandible bent in the form of a hook, narrow
 **Pseudocapritermes**
 Tip of the left mandible not bent in the form of a hook, broad
 **Capritermes**

— Genus *MACROTERMES* Holmgren

KEY TO THE SPECIES

Imagoes

1. *Ocelli almost touching the eyes*; head light castaneous brown, with a few scattered bristles; eyes round; ocelli broadly oval, bulging; second antennal article almost as long as the third, the

third slightly less than one-and-a-half times as long as the fourth ; postclypeus swollen, less than half as long as wide; pronotum indistinctly emarginate anteriorly and posteriorly; head length to tip of labrum 2.66–(2.75), without mandibles (1.87), width (2.13)–2.51, diameter of eye (0.78), distance from the lower margin of the head (0.20); ocellus length (0.41), width (0.32), distance from the eye (0.08); pronotum length 1.44–(1.45), width 2.39. (Holmgren, 1913) **M. azarellii** (Wasmann)

Ocelli appreciably separated from the eyes 2

2. *Ocelli very small, separated from the eyes by more than their long diameter*; head brown, sparsely hairy; antennae with 19 articles, the third smaller than the second; postclypeus shorter than half its width; pronotum not emarginate anteriorly, slightly emarginate posteriorly; head length to tip of labrum 2.89, width 2.43; pronotum length 1.44, width 2.43. (Holmgren, 1913)

... .. **M. malaccensis** (Haviland)

Ocelli separated from the eyes by a distance not exceeding their long diameter 3

3. Ocelli separated from the eyes by half their long diameter or by their short diameter 4

Ocelli separated from the eyes by their long diameter; head black; wings brown; antennae with 19 articles, the third one-and a-half times as long as the second; postclypeus large, strongly arched, half as long as wide; wing membrane not hairy; head length to tip of labrum 3.80, width 3.31; pronotum length 1.71, width 3.31. (Holmgren, 1913) **M. carbonarius** (Hagen)

4. Large species; head width 2.80–2.93 5

Small species; head width 2.25–2.44 5

5. *Head length to tip of labrum 3.40–(3.48); pronotum not indented anteriorly; pronotum width (2.60)–2.70*; head rather densely hairy; pronotum more densely hairy than the head; eyes and ocelli almost round; antennae with 19 articles, the third one-and-a-half times as long as the second; pronotum distinctly emarginate posteriorly; head length without mandibles (2.28), width 2.80–(2.91), long diameter of eye (0.83)–0.90, short diameter (0.78), eye from the lower margin of the head (0.26); ocellus length (0.38), width (0.31), distance from the eye (0.21); postclypeus length (0.52), width (1.04);

- pronotum length (1.50)–1.60. (Snyder, 1934)
 **M. serrulatus** Synder
Head length to tip of labrum 3.27; pronotum distinctly indented anteriorly; pronotum width 2.81; head dark brown, sparsely hairy; ocelli separated from the eyes by their short diameter; postclypeus twice as wide as long; pronotum distinctly indented posteriorly; wing membrane thickly hairy; head width 2.93; pronotum length 1.44 (Holmgren, 1913) **M. estherae** (Desneux)

6. *Head dark brown; abdominal tergites black brown*; pronotum nearly semicircular, weakly emarginate posteriorly, broadly but shallowly concave anteriorly; cubitus with 9 branches, median with several branches in the outer third of the wing; head length to tip of labrum 2.07, width 2.25; ocellus length 0.30, width 0.15, distance from the eye 0.14; pronotum length 1.26, width 2.30–2.35. (Light, 1924) **M. barneyi** Light

Head light reddish brown; abdominal tergites light brown; ocelli broadly oval; antennae with 19 articles, the third slightly longer than the second and the fourth; postclypeus slightly shorter than half its width; pronotum halfmoon-shaped, slightly emarginate posteriorly; head length to tip of labrum (2.65)–2.66, without mandibles (1.87), width 2.28–(2.44); long diameter of eye (0.83), short diameter (0.72), distance from the lower margin of the head (0.15); ocellus length (0.31), width (0.26), distance from the eye (0.15); pronotum length 1.33–(1.56), width 2.36–(2.60). (Holmgren, 1913) **M. gilvus** (Hagen)

Major Soldiers

1. *Tip of labrum greatly elongated, pointed*; head reddish brown, antennae with 17 articles, the third twice as long as the second and one-and-a-half times as long as the fourth; pronotum indistinctly indented anteriorly, distinctly indented posteriorly; lateral sides of meso- and metanota angularly rounded; head length with mandibles 6.50–7.10 (7.20), without mandibles (4.50)–4.75, width (3.90)–4.20; widest width of postmentum (1.00), narrowest width (0.60); pronotum length (1.25)–1.33, width 2.55–(2.60); mesonotum width (2.10); metanotum width (2.20). (Holmgren, 1913)
 **M. malaccensis** (Hav.)

Tip of labrum short, trilobed, not sharply pointed 2

2. *Head almost black*, sparsely hairy, narrowed anteriorly, widest posteriorly; eyes as whitish spot; fontanelle dot-like; antennae with 17 articles, the third nearly twice as long as the second, almost as long as the fourth; postmentum moderately arched, with some fine striations in the anterior half; pronotum very distinctly indented both anteriorly and posteriorly; meso- and metanota angularly rounded; head length with mandibles 8.00, without mandibles (5.18-5.32)-5.60, width (4.53)-4.70; widest width of postmentum (1.08), narrowest width (0.86); pronotum length 1.33, width (3.02-3.09)-3.15; mesonotum width (2.59-2.66); metanotum width (2.58). (Holmgren, 1913) **M. carbonarius** (Hagen)
 Head castaneous brown or lighter 3
3. *Head length without mandibles 3.12*; head reddish brown; lateral sides of meso- and metanota broadly rounded; head length with mandibles 4.54, width 2.66; pronotum width 2.01; metanotum width 1.86. (Holmgren, 1913) **M. azarellii** (Wasmann)
 Head length without mandibles 3.40-5.18 4
4. *Pronotum width (2.00)-2.07*; head yellowish, with a reddish brown tinge, with a few widely scattered bristles; fontanelle located considerably in front of the middle of the head; antennae with 17 articles, the third twice as long as the second, and nearly one-and-a-half times as long as the fourth; pronotum distinctly indented anteriorly, broadly emarginate posteriorly, lateral sides of mesonotum angularly rounded; head length with mandibles 5.20-5.30, without mandibles (3.65)-4.00, width 2.97-(3.00)3.10; postmentum length (2.10), widest width (0.70)-0.82, narrowest width (0.60)-0.61; pronotum length 1.08, width (2.00); mesonotum width 1.22-(1.60); metanotum width 1.80. (Light, 1924)
 **M. barneyi** Light
 Pronotum width 2.30-2.85 5
5. *Head width 2.88(3.00)-(3.10)3.17*; meso- and metanotal angles broadly rounded; head reddish brown, sparsely hairy, fontanelle distinct, located in front of the head; antennae with 17 articles, the third one-and-a-half times as long as the second, slightly longer than the fourth; head length with mandibles (4.80)4.81-(5.00)5.48, without mandibles (3.40)3.46-(3.60)3.65; widest width of postmentum (0.90), narrowest width (0.50); pronotum length (1.15-1.20), width 2.30-(2.60)2.68; mesonotum width (2.10-2.30),

metanotum width (2.20-2.40). (Kemner, 1934)	...	...	...	...	...
...	...	...	...	...	...
Head width 4.10-4.30	...	...	...	...	6

6. *Postmentum* slightly wider in the middle than at the anterior end, strongly arched; antennae with 17 articles, the third nearly twice as long as the second and nearly one-and-a-half times as long as the fourth; postmentum transversely striated; lateral sides of mesonotum angularly rounded; metanotum with more broadly rounded lateral sides than mesonotum; head length with mandibles 6.00(6.62)-6.75, without mandibles 4.69-(4.89), width 4.10(4.14)-4.34; widest width of postmentum (1.08), narrowest width (1.00), pronotum length (1.20)-1.29, width (2.73)-2.85; mesonotum width (2.59); metanotum width (2.80). (Holmgren, 1913) ...

...	...	...	...	...	M. estherae (Desneux)
Postmentum narrower in the middle than at the anterior end, not strongly arched	...	...	...	...	7

7. *Smaller species*, head length with mandibles 6.50, without mandibles (4.32)-4.40, width (3.60)-3.65; head light castaneous brown, sparsely hairy; antennae with 17 articles, the third longer than the second and fourth; mandibles serrulate; posterior margin more distinctly emarginate than the anterior margin; meso- and metanota angularly rounded; widest width of postmentum (0.93), narrowest width (0.79); pronotum length 1.40, width 2.40-(2.52). (Snyder, 1934)

...	...	...	...	...	M. serrulatus Snyder
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Larger species; head length with mandibles (7.41)-7.60, without mandibles 5.00-(5.18), width (4.24)-4.30; head reddish brown, fontanelle located in front of the centre of the head; antennae with 17 articles, the third twice as long as the second, nearly one-and-a-half times as long as the fourth; pronotum slightly emarginate anteriorly, very distinctly emarginate posteriorly; lateral sides of meso- and metanota very narrowly rounded; widest width of postmentum (0.86), narrowest width (0.72); pronotum length (1.30), width (2.66); mesonotum width (2.16); metanotum width (2.16). (Silvestri, 1914) ...

M. annandalei Silvestri

Minor Soldiers

1. *Tip of labrum elongated, pointed*; head reddish brown, with a few scattered hairs; antennae with 17 articles, the third almost as long as or slightly longer than the second; labrum without the

hyaline tip longer than wide, sides convex; pronotum slightly emarginate anteriorly, distinctly emarginate posteriorly, lateral sides angularly rounded; head length with mandibles (4.42)–4.61, without mandibles (2.88)–3.04(3.16), width 2.47–(2.49); widest width of postmentum (0.62–0.64), narrowest width (0.46–0.56); pronotum length 0.95–(0.98), width 1.59–(1.66–1.72); mesonotum width (1.29–1.36); metanotum width (1.44). (Holmgren, 1913)

... .. **M. malaccensis** (Haviland)

Tip of labrum short, trilobed 2

2. *Head almost black*; pronotum with narrowly rounded lateral sides; head length with mandibles (5.02)5.10–(5.20), without mandibles (3.22)–3.27, width (2.67)–2.74(2.75); widest width of postmentum (0.67), narrowest width (0.57); pronotum length 0.95–(1.14–1.19), width 2.01–(2.08); mesonotum width (1.56); metanotum width (1.71–1.76). (Holmgren, 1913) ... **M. carbonarius** (Hagen)

Head reddish brown or lighter 3

3. Head length without mandibles 1.87–2.34 4

Head length without mandibles 2.73–3.00 7

4. Lateral sides of meso- and metanota broadly rounded 5

Lateral sides of meso- and metanota angularly rounded 6

5. *Metanotum narrower than mesonotum*; third and second antennal articles subequal, the fourth shortest; postmentum nearly parallel-sided; head length with mandibles 3.28, without mandibles 2.01–(2.23), width 1.63–(1.92); pronotum length (0.72), width 1.18–(1.4); mesonotum width (1.24); metanotum width 1.10–(1.19). (Holmgren, 1913) **M. azarellii** (Wasmann)

Metanotum wider than mesonotum; third antennal article somewhat longer than the second, and as long as the fourth; head length with mandibles 3.07(3.20)–3.27(3.43), without mandibles 1.84–2.05(2.08–2.29), width 1.52–1.62(1.71–1.92); widest width of postmentum (0.54), narrowest width (0.49); pronotum length (0.78), width 1.14–1.16(1.25–1.35); mesonotum width (1.09–1.14); metanotum width (1.19–1.25). (Kemner, 1934) ... **M. gilvus** (Hagen)

6. *Third antennal article slightly shorter than the second, slightly longer than the fourth*; head light castaneous brown; pronotum more distinctly emarginate posteriorly than anteriorly, head length with mandibles 3.40, without mandibles 2.20, width 1.80; pronotum length 0.80, width 1.25. (Snyder, 1934)

... .. **M. serrulatus** Snyder

*Third antennal article nearly one-and-a-half times as long as the second, slightly longer than the fourth; head brownish yellow; postmentum strongly arched in the middle; head length with mandibles (3.32)–3.42, without mandibles 2.00(2.02)–2.30, width (1.63)1.65–1.75; widest width of postmentum 0.49–(0.52), narrowest width 0.45–(0.46); pronotum length 0.67, width 1.17–(1.19); mesonotum width 0.88–(0.93); metanotum width 1.08–(1.14). (Light, 1924) **M. barneyi** (Light)*

7. *Postmentum wider in the middle than at the anterior end, strongly arched; antennae with 17 articles, the third one-and-a-half times as long as the second, the fourth as long as the third; mesonotum angularly rounded; metanotum more broadly rounded; head length with mandibles 4.43, without mandibles (2.73)–2.96, width (2.30)–2.51; widest width of postmentum (0.83–0.88), narrowest width (0.52–0.67); pronotum length 1.03–(1.04), width (1.71)–1.86; mesonotum width (1.14–1.35); metanotum width (1.40–1.56) (Holmgren, 1913) **M. estherae** (Desneux)*

*Postmentum slightly narrower in the middle than at the anterior end; head reddish brown; pronotum brown; antennae with 17 articles, the third one-and-a-half times as long as the second and nearly equal to the fourth; head length with mandibles (4.46)–5.90, without mandibles (2.88)–3.00, width (2.37)–2.60; widest width of postmentum (0.64); narrowest width (0.54); pronotum width (1.65); mesonotum width (1.22), metanotum width (1.44). (Silvestri, 1914) **M. annandalei** (Silvestri)*

Genus *ODONTOTERMES* Holmgren

KEY TO THE SUBGENERA

Imagoes

1. Fontanelle raised, closed; cut between the third marginal tooth and the molar plate of the left mandible deep . . . **Odontotermes**
 Fontanelle not raised, open; cut between the third marginal tooth and the molar plate of the left mandible shallow
 **Hypotermes**

Soldiers

1. Left mandible with a deep curved notch in the middle, marginal tooth absent **Euscaiotermes**
 Left mandible without notch, marginal tooth present or absent . . . 2

2. Left mandible with a marginal tooth, inner margin at the base
not sinuate **Odontotermes**
Left mandible with marginal tooth; inner margin at the base
sinuate **Hypotermes**

Subgenus *ODONTOTERMES* Holmgren

KEY TO THE SPECIES

Imagoes

1. Ocelli separated from the eyes by half their long diameter or by
their short diameter or even less 2

Ocelli separated from the eyes by their long diameter or more 14

2. Postclypeus shorter than half its width 3
Postclypeus as long as or slightly longer than half its width ... 8

3. Ocelli separated from the eyes by less than half their short
diameter 4

Ocelli more widely separated from the eyes 5

5. *Larger species*; head width 2.96; pronotum width 2.58; head brown,
densely hairy, broadly oval; fontanelle located in the centre of
the head; antennae with 19 articles, the second longer than the
third, the third and fourth subequal; pronotum with a T-shaped
yellow marking, anterior margin slightly indented in the middle;
body length without wings 28.00; length of forewing 13.00–14.00;
pronotum length 1.33. (Holmgren, 1914)
... .. **Odontotermes (O.) proximus** Holmgren

Smaller species; head width (2.26)2.30–2.40(2.45), pronotum width
2.00(2.07)–2.10(2.18); head round, dark reddish brown; fontanelle
located below the level of the ocelli; eyes large, bulging, almost
round; ocelli prominent, broadly oval, bulging; antennae with 19
articles, the second one-and-a-half times as long as the third, the
fourth slightly shorter than the third; postclypeus without hairs in
the middle; pronotum with a T-shaped marking, anterior margin
straight with an indistinct median notch, posteriorly slightly concave
in the middle; head length to tip of labrum (2.35)–2.50(2.75), without
mandibles (1.57–1.80); long diameter of eye 0.65–(0.72), short diameter
(0.57–0.62), distance from the lower margin of the head (0.10–0.13);
ocellus length (0.30–0.37), width (0.22–0.27), distance from the eye

- (0.10-0.13) ; postclypeus length (0.40-0.41), width (0.91-0.93) ;
 pronotum length (1.10)-1.20. (Snyder, 1933a)
 **Odontotermes (O.) dehraduni** (Snyder)
5. Head width 2.09 ; pronotum width 1.82-1.90 6
 Head width 2.28-2.66 ; pronotum width 2.20-2.39 7
6. *Fontanelle not raised, open ; length of forewing 22.00* ; head brown,
 densely hairy, broadly oval ; antennae with 19 articles, the
 second as long as the third and fourth combined, the fourth longer
 than the third ; pronotum with a T-shaped marking, anterior
 margin indented in the middle, posterior margin slightly concave
 in the middle ; body length without wings 11.00 ; head length 2.28,
 width 2.09 ; pronotum width 1.90, length 1.10. (Holmgren, 1913)
 **Odontotermes (O.) preliminaris** (Holmgren)
- Fontanelle raised, not open ; length of forewing 19.00* ; head castaneous
 brown, broadly oval ; fontanelle dot-like ; pronotum distinctly
 indented in the middle anteriorly, emarginate posteriorly ; body
 length without wings 10.00 ; head length to tip of labrum 2.55,
 width 2.09 ; pronotum length 1.03, width 1.32. (Holmgren, 1913)
 **Odontotermes (O.) koenigi** (Linn.)
7. *Pronotum marking solid Y-shaped* ; head castaneous brown,
 broadly oval ; fontanelle dot-like, raised ; antennae with 19
 articles, the second longer than the third, the third as long as the
 fourth ; pronotum slightly notched anteriorly, deeply emarginate
 posteriorly ; mesonotum more widely indented than metanotum ;
 body length without wings 10.00 ; length of forewing 22.00 ; head
 length to tip of labrum 2.55-2.66, width 2.28-2.47 ; pronotum
 length 1.06, width 2.20-2.34. (Holmgren, 1913)
 **Odontotermes (O.) dives** (Hagen)
- Pronotum marking not solid T- or Y-shaped, represented by scattered dots* ;
 head broadly oval ; fontanelle very small, raised ; head length to
 tip of labrum 3.04, width 2.66 ; pronotum width 2.39. (Holmgren,
 1913) ... **Odontotermes (O.) assamensis** Holmgren
8. *Head width 1.98 ; pronotum width 1.90* ; head brown, densely hairy,
 broadly oval ; fontanelle indistinctly raised ; antennae with 19 articles,
 the second longer than the third, the fourth indistinctly shorter than
 the third ; pronotum straight anteriorly, with an indistinct notch in
 the middle, posterior margin not emarginate ; body length without
 wings 11.00, length of forewing 21.00 ; head length 2.20 ; pronotum

- length 0.99. (Holmgren, 1913)
- **Odontotermes (O.) hageni** (Holmgren)
- Head width 2.55-3.28 ; pronotum width 2.09-2.66 9
9. *Fontanelle surrounded by a large triangular yellow area; head width 2.55 ; postclypeus with hairs in the middle ; forewings with distinct subcostal stripe ; body length without wings 12.50 ; pronotum length 1.25, width 2.28. (Holmgren, K. & N., 1917)*
- **Odontotermes (O.) flavomaculatus** Holmgren, K. & N.
- Fontanelle not surrounded by a large triangular yellow area ; head width 2.66-3.28 ; 10
10. *Postclypeus dark brown, nearly of the same colour as rest of the head ; antennae with 20 articles, the second longer than the third and fourth combined, the fourth somewhat longer than the third ; pronotum slightly indented anteriorly and posteriorly ; mesonotum more deeply indented than the metanotum ; body length without wings 12.00-14.00 ; length of forewing 25.00 ; head length to tip of labrum 3.34, width 2.81 ; pronotum length 1.25, width 2.09. (Holmgren, 1913)*
- **Odontotermes (O.) brunneus** Holmgren
- Postclypeus with lighter colour, distinctly lighter than rest of the head ; antennae with 19 articles 11
11. *Head width (3.01)-3.23 ; pronotum width (2.65)-2.66 ; long diameter of eye (0.87), long diameter of ocellus (0.44) ; head light reddish brown ; antennae with 19 articles, the second twice as long as the third, latter shortest ; postclypeus with a few short hairs in the middle ; pronotum with a T-shaped marking ; forewing with a distinct subcostal stripe ; head length to tip of labrum (3.17)-3.23, without mandibles (2.08) ; short diameter of eye (0.60), distance from the lower margin of the head (0.18) ; ocellus width (0.33), distance from the eye (0.24) ; postclypeus length (0.49), width (1.04) ; pronotum length 1.29-(1.40). (Holmgren, 1913)*
- **Odontotermes (O.) wallonensis** (Wasmann)
- Head width up to 2.93 ; pronotum width up to 2.54 ; long diameter of eye up to 0.83 ; ocellus length up to 0.40 12
12. *Postclypeus with hairs in the middle 13*
- Postclypeus without hairs in the middle ; head light reddish brown, with a dense white pubescence ; fontanelle raised ; antennae with 19 articles, the second slightly longer than the third, the latter*

shortest ; pronotum with a T-shaped marking, slightly notched anteriorly, shallowly depressed posteriorly, antero-lateral lobes broadly rounded, dome-shaped ; forewing with a faint subcostal stripe ; head length to tip of labrum (2.65)–2.93, without mandibles (1.61), width (2.59)–2.93 ; long diameter of eye (0.67–0.72), short diameter (0.62–0.67), distance from the lower margin of the head (0.13–0.15) ; ocellus length (0.31), width (0.25), distance from the eye (0.18) ; postclypeus length (0.46), width (0.88) ; pronotum length (1.14)–1.25, width (2.34)–2.47. (Holmgren, 1913)

... **Odontotermes (O.) bangalorensis** Holmgren

13. *Forewings with subcostal stripe* ; head and pronotum reddish brown, T-shaped marking on pronotum yellowish ; eyes and ocelli large, bulging ; antennae with 10 articles, the second twice as long as the fourth, the third shortest ; pronotum with anterior margin slightly notched in the middle, posterior margin with a faint concavity in the middle ; head length to tip of labrum 2.66–(2.70–2.92), without mandibles (1.92–2.12), width 2.66 (2.76–2.88) ; long diameter of eye (0.74–0.81), distance from the lower margin of the head (0.14–0.18) ; ocellus length (0.37–0.40), distance from the eye (0.10–0.14) ; pronotum length 1.14 (1.24–1.36), width 2.28–(2.36–2.51). (Holmgren, 1913) ... **Odontotermes (O.) obesus** (Rambur)

Forewings without subcostal stripe ; head castaneous brown, densely hairy ; postclypeus without hairs in the middle ; with 19 articles, the second twice as long as the third, the third and fourth subequal ; pronotum slightly notched anteriorly, weakly emarginate posteriorly ; head length to tip of labrum 2.66–(2.96), without mandibles (1.76–1.82), width (2.65) 2.66–(2.70) ; postclypeus length (0.44), width (0.83) ; long diameter of eye (0.78–0.83), short diameter (0.70–0.75), distance from the lower margin of the head (0.13) ; ocellus length (0.33–0.36), width (0.23), distance from the eye (0.08–0.09) ; pronotum length (1.25–1.35), width 2.28–(2.39–2.54). (Holmgren, 1913) ... **Odontotermes (O.) redemanni** (Wasmann)

14. Ocellus separated from the eye by a distance appreciably more than its long diameter 15
 Ocellus separated from the eye by nearly its long diameter ... 16
15. *Postclypeus shorter than half its width* ; ocellus length 0.29* ; head dark chestnut-brown ; fontanelle dot-like, slightly elevated ; antennae with 19 articles, the second longer than the third, the third and fourth

*According to Snyder (1933a)

subequal ; pronotum with a T-shaped marking ; body length without wings 13.00, length of forewing 24.00 ; head width 2.02 (?) ; pronotum length 1.29, width 2.48 (Holmgren, K. & N., 1917)

... **Odontotermes (O.) distans** Holmgren, K. & N.
Postclypeus almost as long as half its width ; ocellus length (0.22) 0.23–

0.26 ; head dark brown, round, thickly hairy ; eyes almost round ; ocelli small, broadly oval ; antennae with 18–19 articles ; the second as long as the third and fourth combined ; pronotum with anterior margin almost straight, posterior margin shallowly emarginate, T-shaped marking distinct ; head length to tip of labrum 2.50–(2.88–3.06), without mandibles (1.85–1.96), width (2.55–2.77)–2.80 ; long diameter of eye (0.55–0.64)–0.65, short diameter (0.48–0.55), distance from the lower margin of the head (0.18–0.22) ; ocellus width (0.18–0.22), distance from the eye (0.30–0.40) ; pronotum length (1.14–1.22)–1.25, width (2.25) 2.40–(2.43). (Snyder, 1933a) ...

... **Odontotermes (O.) almorensis** (Snyder)

16. *Head* width 2.09 ; *pronotum* deeply notched in the middle anteriorly ; head light castaneous brown, rather thinly hairy ; postclypeus distinctly shorter than half its width ; antennae with 19 articles, the second twice as long as the third, the latter shortest ; pronotum with a T-shaped marking, posterior margin distinctly emarginate ; head length to tip of labrum 2.28, width 2.09 ; pronotum length 0.95, width 1.90. (Holmgren, 1913) ...

... **Odontotermes (O.) incisus** Holmgren

Head width 2.23–3.00 ; *pronotum* not deeply emarginate anteriorly

... 17

17. *Postclypeus* distinctly shorter than half its width, not strongly swollen ... 18

Postclypeus as long as or only slightly shorter than half its width, strongly swollen ... 23

18. *Length of forewings* 19.00 ; head yellowish brown, round, only indistinctly narrower in front ; antennae with 19 articles ; head length to tip of labrum 2.39, width 2.39 ; pronotum length 0.99, width 2.09. (Hdmgren, 1913)

... **Odontotermes (O.) indrapurensis** Holmgren

Length of forewings more than 19.00 ... 19

19. *Pronotum* without a T-shaped marking ; head reddish brown to light brown, densely hairy ; ocelli and eyes almost round ; pronotum without emargination both anteriorly and posteriorly ; head length to tip of labrum (2.44–2.60), without mandibles (1.45–1.71), width (2.23) 2.28–2.40 ; postclypeus length (0.35–0.36), width (0.88–0.93) ; long diameter of eye (0.46–0.52), short diameter (0.41–0.46), distance

from the lower margin of the head (0.20-0.21) ; ocellus length (0.24-0.26), width (0.18-0.20), distance from the eye (0.27-0.31) ; pronotum length (0.98-1.09)-1.10, width (1.97-2.13)-2.20. (Holmgren, K. & N., 1917)

... **Odontotermes (O.) assmuthi** Holmgren
Pronotum with a T-shaped marking ... 20

20. *Anterior parts of meso- and metanota brown, only slightly lighter than the hind parts* ; third antennal article slightly shorter or as long as the second ; body length without wings 12.00-12.50 ; length of forewing 24.00-26.00 ; head width 2.51-2.62 ; pronotum length 1.09-1.16, width 2.19-2.33. (Kemner, 1934)

... **Odontotermes (O.) grandiceps** Holmgren
Anterior parts of meso- and metanota yellowish, much lighter than the hind parts ... 21

21. *Head width 2.62 ; length of forewings 24.00-25.00* ; head dark brown ; antennae with 19 articles, the second much longer than the third ; mesonotum more deeply notched than metanotum ; head length to tip of labrum 2.85 ; pronotum length 1.18, width 2.39 (Holmgren, 1913)

... **Odontotermes (O.) formosanus** (Shiraki)
Head width 2.37-2.54 ; length of forewings up to 23.50 ... 22

22. *Metanotum very deeply cut posteriorly, postero-lateral lobes angularly rounded* ; second antennal article much longer than the third ; antennae with 19 articles, the third and fourth subequal ; body length without wings 11.00-12.00 ; length of forewings 22.75-23.50 ; head width 2.44-2.50 ; pronotum length 1.06, width 2.12-2.25. (Kemner, 1934)

... **Odontotermes (O.) sundaicus** Kemner
Metanotum not deeply cut posteriorly, postero-lateral lobes broadly rounded ; second antennal article almost as long as the third ; body length without wings 11.00-10.50 ; length of forewings 22.50-23.00 ; head width 2.37-2.54 ; pronotum length 1.09-1.16. (Kemner, 1934)

... **Odontotermes (O.) javanicus** Holmgren

23. *Difference between head width and pronotum width 0.49-0.73* ... 24
Difference between head width and pronotum width 0.08-0.39 ... 25

24. *Larger species ; head width 3.00 ; pronotum width 2.47-2.50 ; body length without wings 18.00-18.20 ; length of forewing 26.00* ; head brownish black ; pronotum dark brown, with a T-shaped marking ; fontanelle raised ; pronotum length 1.41. (Kemner, 1930)

... **Odontotermes (O.) latissimus** Kemner

*Smaller species ; head width 2.66 ; pronotum width 2.17 ; body length without wings 13.00 ; length of forewing 23.00-24.00 ; head dark castaneous brown ; pronotum with a T-shaped marking, not distinctly indented both anteriorly and posteriorly ; forewings with a subcostal stripe ; head length to tip of labrum 2.85. (Holmgren, 1913) ... **Odontotermes (O.) taprobanes** (Wasmann)*

25. Head width 2.30-2.33 26

Head width 2.58-2.90 27

26. *Body length with wings 24.00, without wings 14.50 ; head dark brown ; ocelli separated from the eyes by their long diameter ; pronotum with a T-shaped marking, posterior part of the marking detached from the anterior part, shoulder spots indistinct ; anterior parts of meso- and metanota brown ; wings with a subcostal stripe ; head width 2.32 ; pronotum length 1.14, width 2.16. (Holmgren, K.&N. 1917) ... **Odontotermes (O.) bellahunisensis** Holmgren K. & N.*

*Body length with wings 27.00, without wings 12.00 ; head brown, densely hairy ; eyes strongly bulging ; ocelli separated from the eyes by nearly their long diameter ; antennae with 19 articles, the second one-and-a-half times as long as the third, the fourth slightly longer and thicker than the third ; pronotum slightly indented anteriorly and posteriorly ; mesonotum broadly emarginate posteriorly ; metanotum more narrowly emarginate ; head width 2.30-2.33 ; pronotum length 1.16, width 2.15. (Kemner, 1934) **Odontotermes (O.) makassarensis** Kemner*

27. *Wings very dark brown ; head broadly oval, reddish brown ; eyes strongly bulging ; ocelli large, outer margin concave, inner margin convex, separated from the eyes by their long diameter ; fontanelle small, slightly raised ; postclypeus only slightly shorter than half its width, light yellowish brown ; antennae with 19 articles, the third much shorter than the second ; pronotum with a T-shaped marking, trapeziform ; body length without wings 11.00-11.50 ; length of forewing 21.80-22.00 ; head length without mandibles (1.87), width 2.58 (2.65)-2.69 ; long diameter of eye (0.54), short diameter (0.49), distance from the lower margin of the head (0.13) ; ocellus length (0.26), width (0.20), distance from the eye (0.23) ; pronotum length 1.23(1.24)-1.31, width 2.23 (2.28)-2.33. ... (Kemner, 1934) **Odontotermes (O.) bogoriensis** Kemner*

Wings lighter in colour 28

28. *Fontanelle surrounded by a large whitish area* ; head light castaneous brown, densely hairy ; fontanelle small, raised ; postclypeus slightly shorter than half its width ; antennae with 19 articles, the second longer than the third, the fourth slightly shorter than the third ; pronotum almost as wide as head, emarginate posteriorly, with a T-shaped marking ; mesonotum more broadly notched than metanotum ; body length without wings 12.00–13.00 ; length of forewing 12.50 ; head length to tip of labrum 2.77, width 2.66 ; pronotum length 1.33, width 2.58. (Holmgren, 1913) ...

... **Odontotermes (O.) ceylonicus** Holmgren
Fontanelle surrounded by a very small whitish area ... 29

29. *Larger species* ; head length to tip of labrum 3.30, width 2.85–2.90 ; pronotum length 1.50, width 2.10–2.80 ; head castaneous brown ; fontanelle located in a small depressed area ; eyes not round ; antennae with 19 articles, the second as long as the third and fourth combined ; pronotum lighter in colour than the head, slightly emarginate both anteriorly and posteriorly ; forewings with a yellowish subcostal stripe ; long diameter of eye 0.60 ; body length without wings 14.00 ; length of forewing 27.00. (Snyder, 1934)...

... **Odontotermes (O.) orissae** (Snyder)

Smaller species ; head length to tip of labrum 2.95–3.08, width 2.68–2.85 ; pronotum length 1.33, width 2.31–2.62 ... 30

30. *Wings hairy up to apical one-fourth, length 23.00–24.00* ; anterior part of meso- and metanota yellow ; head dark brown ; antennae with 19 articles, the second indistinctly longer than the third, the fourth slightly shorter than the third ; pronotum with a T-shaped yellow marking, slightly emarginate both anteriorly and posteriorly ; body length without wings 13.00–14.00 ; head length to tip of labrum 3.00, width 2.68–2.77 ; pronotum length 1.41, width 2.53–2.62. (Holmgren, 1913) ... **Odontotermes (O.) horni** (Wasmann)

Wings hairy up to apical half, length 21.00 ; anterior part of meso- and metanota brown ; head light castaneous brown ; antennae with 19 articles, the second almost twice as long as the third, head length to tip of labrum 2.96–3.08, without mandibles (1.92–2.18), width (2.70)2.74–(2.80)2.85 ; long diameter of eye (0.64–0.70), short diameter (0.54–0.61) ; distance from the lower margin of the head (0.18–0.20) ; ocellus length (0.29–0.34), width (0.23–0.26), distance from the eye (0.23–0.27) ; postclypeus length (0.49), width (0.98) ; pronotum length (1.19)1.33–1.41, width (2.31)2.47–2.66. (Holmgren, 1913) ... **Odontotermes (O.) feae** (Wasmann)

Soldiers

1. Postmentum extraordinarily wide and arched, only slightly longer than wide 2

- Postmentum not extraordinarily wide and arched, distinctly longer than wide 3

2. *Larger species* ; head length without mandibles (1.33)–1.40, widest width 1.30 ; distal articles of the antennae darker* than the proximal ones ; head light castaneous brown ; antennae with 16 articles, the second slightly longer than the third and twice as long as the fourth ; angle between the tooth and the inner margin of the left mandible distinctly acute, approximately 45° ; pronotum slightly emarginate anteriorly, distinctly emarginate posteriorly ; head length with mandibles (2.21)–2.40, width at the side base of the mandibles (0.75), at the postero-lateral ends of the antennal foveolae (1.07) ; length of left mandible (0.88), tooth from the base (0.61) ; postmentum length (0.78), widest width (0.65) ; pronotum length (0.52)–0.60, width 0.95–(0.98). (Snyder, 1934)

... .. **Odontotermes (O.) latigula** (Snyder)

- Smaller species*, head length without mandibles (1.04)–1.10, widest width (0.96)–1.00 ; antennae uniformly coloured ; antennae with 15–16 articles, the second as long as or twice as long as the third ; angle between the tooth and the inner margin of the left mandible distinctly acute, approximately 25° ; pronotum slightly indented anteriorly ; head width at the side base of the mandibles (0.57), at the postero-lateral ends of the antennal foveolae (0.80) ; tooth of the left mandible from the base (0.46) ; postmentum length (0.54), width (0.46) ; pronotum length (0.39), width (0.68). (Light, 1924).

... .. **Odontotermes (O.) hainanensis** (Light)

3. Distal articles of the antennae darker than the proximal articles ; angle between the tooth and the inner margin of the left mandible distinctly acute ; mandibles slender 4

- Distal articles of the antennae not darker than the proximal articles 9

4. *Head rectangularly oval* ; *larger species* ; head length with mandibles 2.47–(2.60), without mandibles 1.52–(1.61) ; postmentum slightly

*The antennae of the specimen in the author's collection are broken, but since according to Snyder (1934) it belongs to the *obesus* group it is presumed that the distal articles are darker than the proximal ones. All the species belonging to the *obesus* group possess this character.

more than twice as long as wide ; head reddish brown, sparsely hairy antennae with 16 articles, the second nearly as long as the third and fourth combined ; labrum narrowly rounded anteriorly ; tooth of the left mandible placed in the anterior half, right mandible with an indistinct denticle slightly in front of the middle ; head width at the side base of the mandibles (0.88), at the postero-lateral ends of the antennal foveolae (1.19) ; widest width 1.25-(1.32) ; length of the left mandible (0.91), tooth from the tip (0.39) ; postmentum length (0.80-0.90), width (0.40-0.46) ; pronotum length (0.59), width 0.95-(1.04). (Holmgren, K.&N., 1917) ... **Odontotermes (O.) guardaspurensis** Holmgren, K.&N.

Head oval, distinctly narrowed anteriorly ; smaller species ... 5

5. *Tooth of the left mandible placed near the tip* ; antennae with 16 articles, the second twice as long as the third, the fourth shortest ; pronotum broad dome-shaped anteriorly, slightly notched in the middle ; labrum narrowly rounded apically ; mandibles thin, strongly curved apically ; right mandible with a minute denticle at about the same level as the tooth in the left mandible ; head length with mandibles (1.97)-2.13(2.15), without mandibles (1.22-1.30)-1.37, width at the side base of the mandibles (0.62-0.67), at the postero-lateral ends of the antennal foveolae (0.85-0.96), widest width 1.06-(1.11), widest in the posterior half ; length of the left mandible (0.80-0.83), tooth from the tip (0.23) ; postmentum length (0.72), width (0.44) ; pronotum length (0.52-0.54), width (0.80)-0.84. (Holmgren, 1913) ...

... **Odontotermes (O.) assamensis** Holmgren

Tooth of the left mandible placed at the base of the apical third ... 6

6. Pronotum very distinctly notched anteriorly ... 7
Pronotum only slightly notched anteriorly ... 8

7. *Tooth of the left mandible placed near the middle, distance from the middle (0.08-0.09) ; second antennal article distinctly longer than the third* ; head length with mandibles 1.65(1.64)-1.79(1.97), without mandibles 1.03-1.10(1.17-1.27), width at the side base of the mandibles (0.67-0.68), at the postero-lateral ends of the antennal foveolae (0.93-0.98), widest width 0.95-(1.07-1.11) ; length of left mandible (0.67-0.70), tooth from the tip (0.25-0.26) ; pronotum length (0.44-0.49), width 0.76 (0.80-0.85). (Holmgren, 1913) ... **Odontotermes (O.) bangalorensis** Holmgren

Tooth of the left mandible more anteriorly placed, distance from the middle (0.11-0.12); second antennal article slightly longer than the third; right mandible with a denticle placed a little posterior to the level of the tooth of the left mandible; head length with mandibles (1.92)-2.01, without mandibles (1.17-1.19)-1.25, width at the side base of the mandibles (0.57-0.61), at the postero-lateral ends of the antennal faveolae (0.88-0.91), widest width (1.04-1.06)-1.10; length of the left mandible (0.75-0.80), tooth from the tip (0.26-0.28); pronotum length (0.41-0.45), width (0.76-0.80)-0.87. (Holmgren, 1913)

... .. **Odontotermes (O.) redemanni** (Wasmann)

8. *Smaller species; mandibles comparatively short and stout; head length with mandibles 1.95, without mandibles 1.15, width 1.10; pronotum width 0.80. (Holmgren, K. & N., 1917)*

... .. **Odontotermes (O.) bellahunisensis** Holmgren, K. & N.

Larger species; mandibles comparatively large and slender; head length with mandibles 1.90(1.97)-2.35(2.45), without mandibles (1.25-1.33)-1.52; antennae with 16-17 articles, the second nearly as long as the third and fourth combined; labrum tongue-shaped, broadly rounded anteriorly; head width 1.03(1.05)-(1.25)1.37; pronotum length (0.62-0.87), width (0.77)0.95-(1.02). (Holmgren, 1913)

Odontotermes (O.) obesus (Rambur)

9. Angle between the tooth and the inner margin of the left mandible very distinctly acute, tooth sharply pointed, anteriorly directed 10

Angle between the tooth and the inner margin of the left mandible wider, nearly right angled or greater, tooth usually broad based and laterally directed 19

10. Tooth of the left mandible placed at the base of the apical third 11

... .. Tooth of the left mandible placed almost in the middle 18

11. Small species; head length with mandibles 1.66-2.86, without mandibles 0.98-1.22 12

Large species; head length with mandibles 2.14-2.60, without mandibles 1.35-1.71 13

12. *Head distinctly narrowed anteriorly, ratio between the narrowest and widest widths 1.67; antennae with 16 articles, the second*

slightly longer than the third, the fourth shortest ; angle between the tooth and the inner margin of the left mandible approximately 20° ; right mandible with an indistinct denticle in the median third ; pronotum indistinctly notched anteriorly ; head length with mandibles (1.66)1.70–1.82, without mandibles (0.98)1.06–1.17, width at the side base of mandibles (0.59), at the postero-lateral ends of the antennal foveolae (0.80), widest width (0.98)1.00–1.10 ; length of the left mandible (0.67), tooth from the tip (0.15) ; postmentum length (0.70), width (0.49) ; pronotum length (0.39), width 0.72. (Holmgren, 1913)

... .. **Odontotermes (O.) escherechi** (Holmgren)

Head wider anteriorly, ratio between the narrowest and widest widths 1.25, lateral sides somewhat parallel in the middle ; antennae with 15 articles ; pronotum indistinctly emarginate anteriorly and posteriorly ; head length with mandibles 1.86, without mandibles 1.22, width 1.03 ; pronotum width 0.72. (Holmgren, 1913) ...

... .. **Odontotermes (O.) sarawakensis** (Holmgren)

13. Mandibles stout, straight, slightly incurved at the tips, lateral sides of the head almost parallel in the middle 14

Mandibles slender, thin, strongly curved at the tips 15

14. *Smaller species ; head length with mandibles (2.26–2.41)–2.47, without mandibles (1.55)–1.60 (1.66), widest width (1.09)–1.18 (1.24)* ; head light reddish brown ; antennae with 16 articles, the second twice as long as the third, the latter shortest ; tip of labrum narrowly rounded ; tooth of the left mandible prominent, broad-based, sharply pointed ; pronotum slightly indented anteriorly, slightly emarginate posteriorly ; head width at the side base of the mandibles (0.78–0.91), at the postero-lateral ends of the antennal foveolae (1.04–1.17) ; length of the left mandible (0.80–0.83), tooth from the tip (0.23) ; postmentum length (0.72), width (0.44) ; pronotum length (0.45–0.49), width (0.76)–0.85(0.88). (Holmgren, 1913) ...

... .. **Odontotermes (O.) assmuthi** Holmgren

Larger species ; head length with mandibles (2.58–2.60)–2.62, without mandibles (1.69)–1.71, widest width (1.32–1.35)–1.37 ; antennae with 16 articles, the second slightly longer than the third, the fourth shortest ; tooth of the left mandible sharply pointed, angle between the tooth and inner margin approximately 70° ; right mandible with a denticle almost in the middle ; pronotum distinctly emarginate both anteriorly and posteriorly ; head width at the side base of

the mandibles (0.88–0.91), at the postero-lateral ends of the antennal foveolae (1.19–1.22); length of the left mandible (0.85–0.91), tooth from the tip (0.31–0.32); postmentum length (1.06–1.08), width (0.49–0.52); pronotum length (0.46–0.49), width (0.85–0.93)–0.95. (Holmgren, K. & N., 1917)

... **Odontotermes (O.) malabaricus** Holmgren, K. & N.*

15. *Head considerably arrowed anteriorly, ratio between widest and narrowest widths 1.76*; head length without mandibles 1.62, width 1.31, pronotum width 0.88. (Kemner, 1925)

... .. **Odontotermes (O.) fontanellus** Kemner

Head wider anteriorly, ratio of the widest and narrowest widths

less than 1.70 16

16. *Mandibles stout, broad, right mandible without denticle*: antennae with 16–17 articles, the second nearly twice as long as the third, the latter shortest; labrum narrowly rounded apically; postmentum with more or less parallel sides; pronotum slightly emarginate anteriorly, more distinctly emarginate posteriorly; head length with mandibles 2.22–2.34, without mandibles 1.35–1.47, width at the side base of the mandibles 0.83, at the postero-lateral ends of the antennal faveolae 1.04, widest width 1.16–1.26; length of the left mandible 0.77–0.82, tooth from the tip 0.28; postmentum length 0.86–0.90, width 0.54–0.56, pronotum length 0.48–0.53, width 0.79–0.83. (Ahmad, 1947)

... .. **Odontotermes (O.) paradenticulatus** Ahmad

Mandibles slender, narrow, right mandible with a denticle ... 17

17. *Length of the left mandible 1.01*; head somewhat rectangularly oval, slightly narrowed anteriorly; antennae with 16 articles, the

*Snyder (1933a) gives a description of *Odontotermes (O.) malabaricus* entirely different from that of Holmgrens, K. & N. (1917), the authors of the species. According to Snyder the "left mandible has a rudimentary, marginal tooth nearer to its base than to apex". On the other hand Holmgrens remark that the soldier of *malabaricus* "agrees quite well with that of *Odonotermes (O.) assmuthi* but is larger and more stoutly built". *Odontotermes (O.) assmuthi* has a very different mandibular pattern from that described by Snyder for his "*Odontotermes (O.) malabaricus*". The author has in his collection specimens of *Odontotermes (O.) malabaricus* determined by Holmgren, K. & N. and are from Shevaroy Hill, one of the original localities from which *malabaricus* was described. The specimens match very well with soldiers of *Odontotermes (O.) assmuthi*, except in size. On the basis of this discussion the species (comprising both imagoes and soldiers) described as *Odontotermes (O.) malabaricus* by Snyder should be redesignated.

second almost as long as the third, the fourth shortest, tooth of the left mendible sharply pointed, making an angle of approximately 70° with the inner margin of the mandible ; pronotum indistinctly notched anteriorly, distinctly emarginate posteriorly ; head length without mandibles 1.43, width at the side base of the mandibles 0.83, at the postero-lateral ends of the antennal foveolae 1.11, widest width 1.24 ; tooth of the left mandible from the tip 0.39 ; postmentum length 0.88, width 0.57 ; pronotum length 0.49, width 0.99 ... **Odontotermes (O.) indrapurensis** Holmgren*

*Length of the left mandible (0.78-0.85), antennae with 16-17 articles, the second one-and-a-half to twice as long as the third, head length with mandibles 2.10(2.14)-2.32(2.36), without mandibles (1.39) 1.44-(1.50) 1.63, width at side base of the mandibles (0.75-0.78), at the level of the postero-lateral ends of the antennal foveolae (1.01-1.14), widest width 1.13(1.24)-1.25(1.32) ; tooth of the left mandible from the tip (0.27-0.29) ; postmentum length (0.70), width (0.46) ; pronotum length (0.46-0.52), width (0.83) 0.84-0.87. (Holmgren, 1913) ... **Odontotermes (O.) formosanus** (Shiraki)*

18. *Head and antennae brown ; inner margin of the left mandible beyond the tooth strongly curved ; lateral sides of the head almost parallel in the middle ; antennae with 17 articles, the second one-and-a-half times as long as the third, the third slightly shorter than the fourth ; labrum broadly rounded apically ; pronotum slightly indented anteriorly ; head length with mandibles (2.86)-3.04(3.30), without mandibles 1.75(1.82)-1.90(1.97), width at the side base of the mandibles (0.93-1.04), at the postero-lateral ends of the antennal foveolae (1.35-1.45), widest width (1.40)-1.44(1.56) ; length of the left mandible (0.98-1.09), tooth from the tip (0.44-0.46) ; postmentum length (1.04), width (0.46-0.52) ; pronotum length (0.62-0.67), width (1.07)-1.14(1.19). (Holmgren, 1913) ...*

... .. **Odontotermes (O.) brunneus** (Wasmann)

Head and antennae yellowish ; inner margin of the left mandible beyond the tooth slightly curved ; lateral sides of the head slightly convex ; labrum broadly rounded apically ; tooth of the left mandible making an angle of approximately 50° ; right mandible with an indistinct denticle at about the same level as the tooth in the left mandible ; head length with mandibles 2.70-(2.80-2.86), without mandibles (1.61)-1.63(1.74), width at the side base of the mandibles (0.83-0.96), at the postero-lateral ends of the antennal

*Hitherto unknown. The specimen determined by Holmgren.

- foveolae (1.11–1.30) ; widest width (1.27)–1.29(1.45) ; length of the left mandible (0.98–1.01) ; tooth from the tip (0.39–0.41) ; postmentum length (0.98), width (0.46), pronotum length (0.59–0.62), width (0.98–1.09)–1.14. (Holmgren, 1913) ...
- ... **Odontotermes (O.) wallonensis** (Wasmann)
19. Head only slightly narrowed anteriorly, ratio of widest width and narrowest width 1.22–1.31 ... 20
- Head narrower anteriorly ... 21
20. *Head length with mandibles 2.47, without mandibles 1.63 ; tooth of the left mandible large ; mandibles very stout ; head yellow to yellowish brown ; antennae with 16 articles, the second longer than the third, the third longer than the fourth ; labrum tongue-shaped, tip triangularly pointed ; right mandible with a denticle in the middle ; pronotum slightly indented anteriorly ; head width 1.03 ; pronotum width 0.72. (Holmgren, 1914) ...*
- ... **Odontotermes (O.) butteli** Holmgren
- Head length with mandibles 2.85–(3.06), without mandibles 1.90–(2.08) ; tooth of the left mandible small ; mandibles rather slender ; head yellowish ; antennae with 16 articles, the second one-and-a-half times as long as the third, the fourth shortest ; labrum tongue-shaped, somewhat triangularly pointed ; right mandible with a denticle in the middle ; head width at the side base of the mandibles (1.09), at the postero-lateral ends of the antennal foveolae (1.35), widest width 1.33–(1.44) ; length of the left mandible (1.01), tooth from the tip (0.42) ; postmentum length (1.30), width (0.52) ; pronotum length (0.57), width (0.93)–0.95. (Holmgren, 1913) ...*
- ... **Odontotermes (O.) oblongatus** Holmgren
21. Head length with mandibles 4.22–4.80, without mandibles 2.36–2.60 ... 22
- Head length with mandibles up to 4.16, without mandibles up to 2.34 ... 25
22. *Labrum broadly rounded anteriorly, head length with mandibles 4.80, without mandibles 3.20, width 2.60. (Silvestri, 1914) ...*
- ... **Odontotermes (O.) gravelyi** Silvestri
- Labrum narrowly rounded anteriorly ... 23
23. *Head length with mandibles 4.52–4.71 ; antennae with 17 articles, the second much longer than the third, the fourth nearly as long as*

the second ; labrum reaching up to the middle of the mandibles ; mandibles very stoutly built, straight except at the tips ; tooth of the left mandible prominent, placed almost in the middle ; head length without mandibles 2.93-3.17, width 2.54-2.60, pronotum width 1.77-1.92. (Kemner, 1930)

... .. **Odontotermes (O.) maximus** Kemner
Head length with mandibles 4.22-4.44 24

24. *Difference between the head width at the postero-lateral ends of the antennal foveolae and at the middle (0.26-0.28); postmentum more than twice as long as wide ; antennae with 17 articles, the second one-and-a-half times as long as the third, the latter shortest; tooth of the left mandible broad-based, angle with the inner margin of the mandible approximately 125° ; head length with mandibles 4.22-(4.42), without mandibles 2.89-(3.10), widest width 2.36-(2.44-2.59), length of the left mandible (1.50), tooth from the tip (0.81-0.83) ; pronotum length (0.93), width 1.67-(1.76). (Holmgren, 1914)*

... .. **Odontotermes (O.) longignathus** Holmgren
Difference between the head width at the postero-lateral ends of the antennal foveolae and at the middle (0.35), postmentum nearly twice as long as wide ; antennae with 17 articles, the second twice as long as the third, the latter shortest, the fourth longer than the fifth ; tooth of the left mandible blunt ; mandibles stout ; pronotum slightly emarginate anteriorly, more distinctly emarginate posteriorly ; head length with mandibles 4.42, without mandibles 2.86, widest width 2.48, widest in the middle; length of the left mandible 1.45, tooth from the tip 0.81; postmentum length 1.71, width 0.83 ; pronotum length 0.83, width 1.71. (All measurements by the author) **Odontotermes (O.) praevalens** John

25. Head only slightly narrowed anteriorly, ratio between the widest and narrowest widths up to 1.39 26

Head narrower anteriorly, ratio between the widest and narrowest widths more than 1.39 28

26. *Tooth of the left mandible placed in the middle, large, sharply pointed ; antennae with 16 articles, the second slightly longer than the third, the fourth shortest ; tip of labrum narrowly rounded ; angle between the tooth and the inner margin of the left mandible slightly less than 99° ; right mandible with an indistinct denticle about the middle ; postmentum uniformly wide ; head length with mandibles (2.86)-2.93(3.06), without mandibles (1.71)-1.79(2.02), width at the side base of the mandibles (1.09-1.14), at the postero-*

lacrar ends of the antennal foveolae (1.35–1.40), widest width (1.24)–1.36(1.45), length of the left mandible (1.14–1.19), tooth from the tip (0.54–0.57) ; postmentum length (1.24), width (0.52) ; pronotum length (0.57–0.62), width (0.98)–1.03(1.09). (Holmgren, 1913) ... **Odontotermes (O.) ceylonicus** Holmgren

Tooth of the left mandible placed below the middle, small, not sharply pointed. ... 27

27. *Smaller species ; head length with mandibles 2.74, without mandibles 1.82 ; head yellow ; antennae with 17 articles, the second as long as the third and fourth combined ; labrum pointed anteriorly, lancet-shaped, reaching up to the middle of the mandibles, with a denticle ; pronotum deeply indented anteriorly ; head width 1.48 ; pronotum width 1.03.* (Holmgren, 1913) ...

... **Odontotermes (O.) billitoni** Holmgren

Larger species ; head length with mandibles 3.23, without mandibles 2.01, ratio between the widest and narrowest widths 1.39 ; head width 1.63 ; pronotum width 1.22. (Holmgren, K. & N., 1917) ...

... **Odontotermes (O.) faeoides** Holmgren, K. & N.

28. Length of the left mandible 1.35–1.66, head length with mandibles 3.60–4.16 ... 29

Length of the left mandible less than 1.35 ; head length with mandibles 2.30–3.69 ... 33

29. *Tooth of the left mandible placed in the basal third, minute ; antennae with 16 articles, the second one-and-a-half times as long as the third ; labrum with a narrowly rounded tip ; pronotum slightly indented anteriorly ; head length with mandibles 3.61–(3.73–3.83), without mandibles 2.24–(2.51), head width at the side base of the mandibles (1.14–1.26), at the postero-lateral ends of the antennal foveolae (1.64–1.82), widest width (1.88–2.07), length of the left mandible (1.40–1.56), tooth from the tip (0.94–0.98) ; postmentum length (1.40–1.56), width (0.67–0.78) ; pronotum length (0.78), width (1.36)–1.40(1.48).* (Holmgren, K. & N., 1917) ...

... **Odontotermes (O.) parvidens** (Holmgren, K. & N.)

Tooth of the left mandible more anteriorly placed ... 30

30. Mandibles longer than half the head length (without mandibles) ... 31

Mandibles as long as or shorter than half the head length ... 32

31. *Tip of labrum not pointed; head somewhat rectangular; pronotum slightly indented anteriorly; antennae with 17 articles, the second slightly longer than the third, in some specimens much longer than the third; tooth of the left mandible placed below the middle; head length with mandibles 4.07-(4.10), without mandibles (2.70)-2.77, width at the side base of the mandibles (1.37-1.50), at the postero-lateral ends of the antennal foveolae (1.87-2.02), widest width 2.09-(2.18); length of the left mandible (1.50-1.66), tooth from the tip (0.83-0.93); postmentum length (1.87-1.97), width (0.78-0.83); pronotum length (0.97-0.98), width (1.66)-1.71(1.78). (Holmgren, 1913) **Odontotermes (O.) horni** (Wasmann)*

*Tip of labrum pointed; head distinctly narrowed anteriorly; pronotum deeply indented anteriorly; antennae with 17 articles, the second nearly twice as long as the third, the latter shortest; tooth of the left mandible small; head length with mandibles 3.60-3.80(4.00); without mandibles 2.32-2.39(2.60), head width at the side base of the mandibles (1.30-1.35), at the postero-lateral ends of the antennal foveolae (1.76-1.87), widest width 1.94-2.13(2.18-2.24); length of the left mandible (1.40-1.45), tooth from the tip (0.67-0.70); postmentum length (1.61), width (0.72-0.78); pronotum length (0.78-0.79), width (1.56)-1.63. (Holmgren, 1913) **Odontotermes (O.) feae** (Wasmann)*

32. *Postmentum distinctly wider in the basal third; tip of labrum rather broadly rounded, stump-like; tooth of the left mandible large, placed almost in the middle; inner margin of the left mandible beyond the tooth concave; antennae with 17 articles, the second nearly twice as long as the third; pronotum slightly indented both anteriorly and posteriorly; head length with mandibles 3.75-4.04 (4.16), without mandibles 2.80-(2.85)2.90, width at the side base of the mandibles (1.45-1.56), at the postero-lateral ends of the antennal foveolae (1.97-2.13), widest width 2.23-2.26(2.34-2.39); length of the left mandible (1.45-1.50), tooth from the tip (0.78-0.81); pronotum length (0.85-0.95), width 1.52-1.55(1.61-1.71). (Kemner, 1934) **Odontotermes (O.) bogoriensis** Kemner*

Postmentum almost uniformly wide; tip of labrum narrowly rounded; tooth of the left mandible small, blunt, placed below the middle; inner margin of the left mandible beyond the tooth slightly convex in the middle; antennae with 17 articles, the second one-and-a-half times as long as the third, the latter shortest; pronotum emarginate anteriorly and posteriorly; head length with mandibles 3.65 (3.84-3.94)(4.16) without mandibles 2.47 (2.60)-2.65 (2.78), width at the

side base of the mandibles (1.40–1.45), at the postero-lateral ends of the antennal foveolae (1.97), widest width 1.94–2.15 (2.18–2.23); length of the left mandible (1.35–1.45), tooth from the tip (0.78); postmentum length (1.92), width (0.62–0.67); pronotum length (0.78–0.83), width 1.41–1.55 (1.56–1.58). (Kemner, 1934) ...

... .. **Odontotermes (O.) grandiceps** Kemner

33. *Head length with mandibles 3.55–3.65 (3.69)*; antennae with 16 articles, the second slightly longer than the third, the fourth shortest; labrum extending up to the tooth of the left mandible, sides distinctly convex; tooth of the left mandible large, placed slightly below the middle, laterally directed, angle with the inner margin of the mandible approximately 110° ; pronotum slightly indented anteriorly, distinctly emarginate posteriorly; head length without mandibles 2.33–2.40 (2.54), width at side base of the mandibles (1.30), at the postero-lateral ends of the antennal foveolae (1.76), widest width 1.91–1.94 (2.08); length of the left mandible (1.19), tooth from the tip (0.67), postmentum length (1.56), width (0.72); pronotum length (0.72); width (1.19)–1.34. (Kemner, 1934) ...

... .. **Odontotermes (O.) karnyi** Kemner

Head length with mandibles up to 3.46 34

34. Mandibles as long as or shorter than half the head length ... 35
Mandibles longer than half the head length 37

35. *Labrum broadly rounded apically, tongue-shaped*; antennae with 17 articles, the third much shorter than the second, extending up to the middle of the mandibles; head length with mandibles 3.19, without mandibles 2.13, width 1.71; pronotum width 1.18 (Holmgren, 1913)...**Odontotermes (O.) holmgreni** Snyder & Emerson

Labrum narrowly rounded apically 36

36. *Labrum extending up to the tooth of the left mandible; inner edge of the left mandible below the tooth strongly convex*; tooth sharply pointed, placed slightly below the middle; antennae with 17 articles, the second twice as long as the third, the latter shortest; head length with mandibles 3.27–3.36, without mandibles 2.19 (2.34)–2.44 (2.49) width at the side base of the mandibles (1.24), at the postero-lateral ends of the antennal foveolae (1.66–1.71), widest width 1.80 (1.89)–(1.92) 1.94; length of the left mandible (1.19), tooth from the tip (0.70); postmentum length (1.45), width (0.72); pronotum length (0.72), width 1.27–(1.35)1.41. (Kemner, 1934)

... .. **Odontotermes (O.) javanicus** Holmgren

Labrum extending beyond the tooth of the left mandible ; inner margin of the left mandible below the tooth slightly convex ; tooth minute, laterally directed, angle approximately 115° ; antennae with 17 articles, the second almost twice as long as the third ; head length with mandibles 3.08–3.17(3.38), without mandibles 1.98–2.10 (2.23–2.28), width at the side base of the mandibles (0.62), at the postero-lateral ends of the antennal foveolae (1.66–1.71), widest width 1.62–1.73 (1.92) ; length of the left mandible (1.14–1.16), tooth from the tip (0.67–0.72) ; postmentum length (1.50), width (0.72) ; pronotum length (0.72), width 1.20–1.23(1.30). (Kemner, 1934) ...

... **Odontotermes (O.) sundaicus** Kemner

37. *Large species ; head length with mandibles 3.46, without mandibles 2.24, width 1.90 ; tooth of the left mandible placed in the basal third ; pronotum width 1.48. (Holmgren, K. & N., 1917) ...*

... **Odontotermes (O.) mirganjensis** Holmgren, K. & N.

Small species, head length with mandibles up to 3.23, without mandibles up to 2.05, width up to 1.79 ... 38

38. *Tooth of the left mandible placed in front of the middle ... 39*

Tooth of the left mandible placed in the middle or below the middle ... 40

39. *Tips of the mandibles strongly incurved, mandibles comparatively stoutly built ; head length with mandibles 2.89–3.23, without mandibles 1.79–2.01, width 1.44–1.79, ratio between the widest and narrowest widths (1.58)* ; pronotum width 0.99–1.29. (Holmgren, K. & N., 1917), ...*

... **Odontotermes (O.) anamallensis** Holmgren, K. & N.

Tips of the mandibles only slightly incurved ; mandibles comparatively slender ; head yellow to brownish yellow ; labrum tongue-shaped ; antennae with 17 articles, the second longer than the third, the fourth indistinctly longer than the third ; pronotum indented anteriorly, broadly emarginate posteriorly ; head length with mandibles 3.23, without mandibles 2.05, width 1.63, ratio between the widest and narrowest widths (1.59–1.62) ; pronotum width 1.29. (Holmgren, 1914) ...*

... **Odontotermes (O.) malaccensis** Holmgren

40. *Labrum extending slightly beyond the tooth of the left mandible, sides distinctly convex ; antennae with 17 articles, the second twice as*

*See Ahmad (1949)

long as the third; tooth of the left mandible large, laterally directed, placed slightly below the middle; basal tooth of the left mandible distinct, stump-like, inner margin of the left mandible posterior to the tooth almost straight; head length with mandibles 2.83-3.00, without mandibles 1.73-1.91, width 1.45-1.48; pronotum width 1.03-1.09. (Kemner, 1934) ... **Odontotermes (O.) djampeensis** Kemner

Labrum not extending up to the tooth of the left mandible ... 41

41. *Labrum narrow, sides weakly convex, longer than wide, lancet-shaped*; tooth of the left mandible almost in the middle; antennae with 17 articles, the second nearly twice as long as the third, the latter shortest; head length with mandibles 3.00-(3.01)3.18, without mandibles 1.80-(1.87)1.98, width at the side base of the mandibles (1.04), at the postero-lateral ends of the antennal foveolae (1.14), widest width 1.52-1.65 (1.66); length of the left mandible (1.09), tooth from the tip (0.62); postmentum length (1.07), width (0.57); pronotum length 0.60-(0.62)0.63, width 1.03-(1.09)1.13. (Kemner, 1934) ... **Odontotermes (O.) makassarensis** Kemner

Labrum broad, sides distinctly convex, almost as long as wide, dome-shaped; antennae with 17 articles, the second twice as long as the third; mandibles rather thin, tooth of the left mandible placed distinctly behind the middle; head length with mandibles 2.80-3.08, without mandibles 1.66-1.87, width 1.41-1.57, pronotum width 0.88-1.02. (Kemner, 1934)

... .. **Odontotermes (O.) boetonensis** Kemner

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